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ADEQUATE MAINTENANCE NECESSARY TO PROTECT RATE SCHEDULES

Approaching spring brings the construction season, which means increased activity in all lines—from baseball training camps to utility line gangs. Even such stock subjects of conversation as the business depression or new taxes cannot monopolize all attention when the calendar broadcasts: "Spring is here!"

In these days of retrenchment many prudent business men admit they need to do considerable buying for necessary construction work, but because of abnormal conditions they are inclined to postpone their expenditures as long as possible. This exaggerated caution is one of the penalties the country is paying today for the era of reckless inflation that came to a halt three years ago.

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Telephone companies, however, like other public utilities, are compelled to maintain their plants in shape to render satisfactory service, and are now making plans for 1932.

Hundreds of jobs, either on outside or inside plant, which have been postponed all too long already, will be carried out this year, partly because of lower prices of materials required and partly because it would be dangerous to defer the work any longer.

While it may be said that some companies are withholding their orders for equipment and supplies to be used this year, nevertheless, they are deciding what their requirements will be. They will be in the market in the near future.

A mild winter in most sections of the country has enabled companies to carry on an unusual amount of construction work during January and February. March brought severe sleet storms in several Middle West states and tornadoes in the South which did heavy damage to pole lines and compelled the companies in those districts to revise their requirements. Many a company will have to enlarge its buying program this spring because of the havoc wrought by these recent storms.

The low prices prevailing in most markets, and the easier banking situation—which will facilitate any necessary financing—will temper the blow suffered by service companies operating in devastated sections. As a matter of fact, the companies with proper depreciation reserves were already prepared for such hazards, and their main duty will be to decide just how much additional material they will need to purchase at this time to repair the damage.

* * * *

Far-sighted telephone men are realizing that it is more important today to keep their plants in good working order than ever before. This is due to the rate situation in nearly all parts of the country. Justified or not, the public is pondering the question as to whether service rates should not be reduced to keep step with other falling prices. Generally speaking, telephone rates cannot be reduced with safety, but demonstration of this fact does not always end the discussion.

The best answer on the part of the company is to maintain a high grade of service and not allow the charge to be successfully made that operating economies have been made at the expense of quality of service. This may mean extra effort on the part of the working force, and "buying as usual" by the management to meet construction needs, but such a policy constitutes the first line of defense in combating demands for rate reductions.

To neglect proper maintenance, or to allow service standards to sag in these days of public agitation, would be playing into the hands of the political mischief-makers who are attacking existing utility rates. On the other hand, to keep their plants in good condition, and to convince the public that they are giving adequate, efficient service in hard times as well as in good times, is the most effective argument telephone men can present at this time.

Another factor to be considered is the attitude of the regulatory commission. Pressure is being brought to bear on utility commissions to compel companies to reduce rates, but in most cases, where the service company is doing its best to maintain the plant adequately and give good service the commissions have had excellent reasons for refusing to make reductions. However, if service deteriorates, and the company neglects proper maintenance, the commissions will have an excuse for yielding to public clamor and cutting rates.

Companies will help the commissions and themselves materially by keeping plant and service up to efficient standards.

The Mortar Bandage for Conduit Joints

Development of Underground Conduit—Installation of Clay Conduit and Types of Joints Tried—New Method Recently Developed—Description of the Mortar Bandage Conduit Joint, How Made and Applied—Its Advantages

By J. M. Hardesty,
Member of Technical Staff, Bell Telephone Laboratories, Inc.

Nearly 50 years ago the demand for telephone service had already grown to such an extent that it became necessary to find ways of putting communication wires underground, particularly in certain city locations. For most of the early underground installations, cables were constructed by drawing insulated wires through lead pipes, which were then filled with paraffin. These cables were laid in the ground, usually in a wooden trough, and covered over with pitch or asphalt.

By 1883 it had come to be realized that a system of ducts was needed for housing cables so that any cable, which because of defect or for other reason needed to be withdrawn, could be readily recovered.

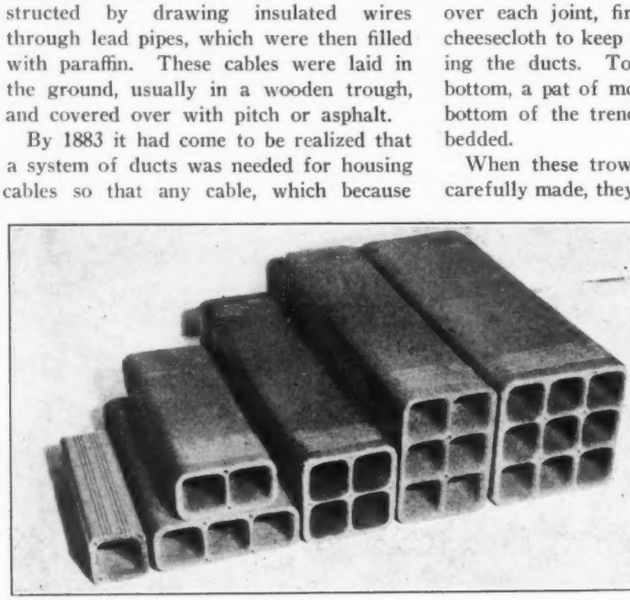


Fig. 1. Type of Vitrified Clay Conduit Used in the Telephone Plant—

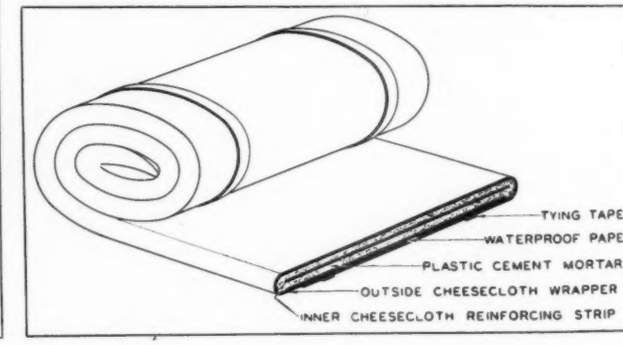


Fig. 2. Cross-Section Mortar Bandage Showing Interior Construction.

For the first of these installations the conduit employed was iron pipe, with an outside diameter of approximately three inches. It was encased in concrete and terminated in water-proofed brick manholes. From 1884 to 1890 the duct material most used for cable "drawing-in" subways was either iron pipe or wooden conduit.

About this time vitrified clay or glazed tile was also tried for cable conduit. The first designs were not very satisfactory, but within two or three years the manufacturers of this material learned how to make hollow clay ware which could be fabricated with one, two, or several ducts in the same piece. This type of conduit was not expensive to install, and also when put in the ground it was more permanent than iron pipe, which would rust, or wood conduit, which was apt to decay.

Consequently, in the telephone field in the United States, vitrified clay conduit has been for many years the most used type of underground conduit for main line construction. The various units in common use in the telephone plant today are shown in Fig. 1.

In installing clay conduit the sections laid in the trench are doweled together with short steel pins to align the ducts. To make the joints reasonably tight, it has been the practice to trowel cement mortar over each joint, first applying a strip of cheesecloth to keep the mortar from entering the ducts. To seal the joint at the bottom, a pat of mortar is first laid in the bottom of the trench and into this tile is bedded.

When these troweled mortar joints are carefully made, they are usually sufficiently tight so that even after a number of years not enough silt enters the ducts through the joints to prevent pulling cables in or out. It is often difficult, however, to make sure of a good job, particularly underneath the tiles, or between two tiles laid closely side by side where the joint cannot be reached with a trowel.

Often an infiltration of silt will not cause trouble until several years after the line has been installed; but when the trouble does appear, it is dearly paid for in the extra cost of rodding and cleaning the ducts, or in excavating to clear obstructions.

Many types of conduit joints have been tried to discover a method of joining which would be more effective in excluding silt and still be as practical as the troweled mortar joint. These have included plastered asphalt joint coverings, melted asphalt, or asphalt emulsions applied on cloth strips and wrapped around the joint, mortar joint coverings confined close to the joint by thin sheet metal forms, and joints made with conduit having special shaped ends (as bell and spigot ends) joined with cement mortar, or with soft gaskets.

Experience and study of all of the different methods have led to the conclusion that, for general application in the Bell System, a method is desirable which is still better than these from the standpoints of strength, silt tightness, and ease of application.

Within the past year a new method for joining clay conduit has been developed which promises to be both practical to use and effective in excluding silt. This is called the "Mortar Bandage Conduit Joint." As the name implies, the new joint covering is a bandage or poultice which is wrapped around the joint. This bandage is from five to seven inches wide, with a cheesecloth envelope filled with plastic cement mortar which hardens after the joint has been wrapped.

Schemes similar to the mortar bandage joint have been tried before, but have not proved satisfactory. As with many inventions which seem simple in the finished state, there were several problems of technique and materials which had to be solved before a satisfactory bandage could be made. One of these was to design a bandage easy to handle and apply uniformly and yet thick enough to provide a strong joint.

A bandage constructed by merely encasing a half-inch thick ribbon of mortar in a cheesecloth covering did not handle satisfactorily because the mortar filling slumps or sags down in the casing. To avoid this the bandage was built up first of a quarter-inch layer of mortar, then a strip of reinforcing cheesecloth, and finally a second quarter-inch layer of mortar.

The design of the bandage and the kind of mortar used had to be adjusted to insure a firm bond to the surface of a vitrified clay conduit. This was accomplished by using cheesecloth with meshes large enough to allow the cement mortar paste

to flood through when the bandage was pressed against the tile, and by employing a mortar with the desired amount of cement paste.

The mortar found most effective to use was a 1:1½ mixture of special portland cement and sand, plus a small amount of diatomaceous earth, a very fine powder which, holding a large amount of water, makes the mortar plastic and keeps it so for a considerable time. When the bandage is pressed against the surface of the conduit, this water is available for flooding cement mortar paste through the cheesecloth, if it is used within half an hour after making.

The bandage had to be designed so that it would not be messy to handle and so that the water would remain inside, available for hardening the mortar after the joint was wrapped. This was accomplished by putting a piece of stiff waterproofed paper in the bandage so as to be on the outside of the bandage and just under the outer cheesecloth covering when the joint is wrapped. The construction of the bandage is shown in Fig. 2.

The paper is shown being put in place in Fig. 3. It keeps the cement mortar paste from flooding through to the outside of the bandage and at the same time allows it to flood freely through to the tile surface. To keep it compressed firmly against the conduit until the cement mortar hardens, the wrapped bandage is tied firmly in position by cotton tapes.

A method has been worked out whereby bandages in condition, ready for use, can be made up quickly and easily in the field. A portable bench is provided as shown in Fig. 3, and at it two men can make bandages at the rate of about one per minute.

A strip of cheesecloth three times as wide as the steel tray, is laid lengthwise down the tray so that the edges of the cloth hang over the sides and on it is troweled a quarter of an inch of mortar. On this mortar is placed the reinforcing strip of cheesecloth and on top of it another quarter inch of mortar is troweled. The water-proof paper is then laid on and the edges of the outer cheesecloth wrapper are folded over it.

In the meantime the typing tapes have been laid on the raised shelf at the side of the steel tray, and the bandage is now tipped over on top of them. The bandage is then rolled up from both ends together with the tapes and is ready to be applied to the conduit.

The various steps in the application are shown in Fig. 4. The bandage is partially unrolled and placed in the bottom of the trench where the conduit joint will lie. To cause the cement mortar paste to flood through and make a good joint, the inside is patted or smoother, Fig. 4-A.

After it has been wrapped around the joint the outside is stroked for the same purpose as shown in Fig. 4-C. The final step is firmly tying the wrapping tapes to hold the bandage tight to the conduit until a firm union has been formed by the hardening of the cement, Fig. 4-D.

Clay conduit runs joined with mortar bandages are strong enough to be self-supporting over any reasonable length of span, such as might happen in case a cross trench is opened underneath it. In certain tests that have been made, a 6-foot unsupported span of two-duct conduit, laid flat and containing three joints, withstood a 1,000-pound load.

These high strengths that can be developed in mortar bandage joints are expected to make possible considerable savings in telephone plant work by reducing the number of occasions in which the concrete base or concrete top, usually employed to maintain conduit alignment, are required.

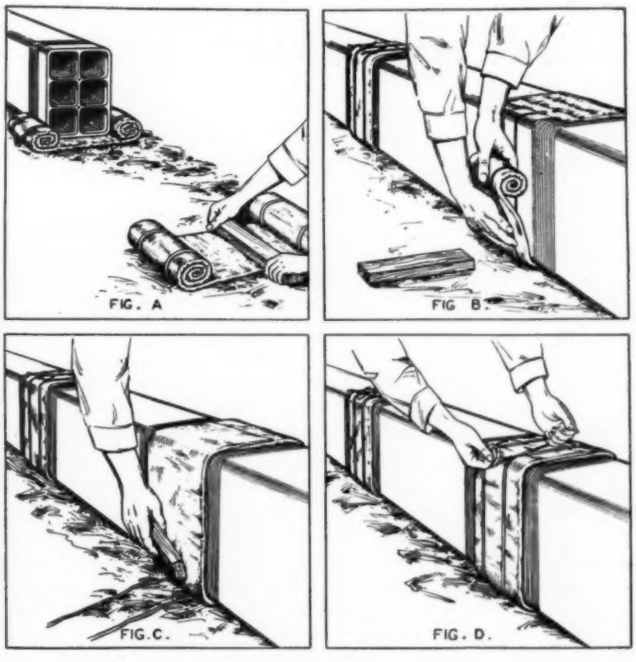


Fig. 3. Portable Bench Upon Which Mortar Bandages Are Made—Fig. 4. Graphic Description of the Method of Applying the Bandage.

Mortar bandage conduit joints are decidedly more effective in excluding silt and water from conduit runs than any other type of joint which has been investigated. At the Bell Telephone Laboratories' field experiment station at Chester, N. J., this characteristic has been tested several times in specially-constructed "flooding trenches."

Another advantage of the new joints is that since the mortar is confined in a cheesecloth envelope, it is not apt to be cracked or injured by slight motion of the conduit, such as those caused by the workmen stepping on the tiles. In fact, after the bandages are put on, the conduit can be shifted slightly to align it in the trench without injury, provided that any such moving is done before the mortar has started to set.

A feature of greater importance is that back-filling on mortar bandaged joints can be done immediately after the joints are finished, rather than waiting for several hours as is required in the case of the troweled mortar joint.

Some 10,000 duct feet of conduit joined with mortar bandages have been installed at Chester by the laboratories' engineers under field conditions not essentially different from those encountered in the telephone plant. This new joining method has also been used already by several Bell associate companies on test jobs under varying conditions.

The technique involved in making and using the bandages is easily acquired by the same workmen that are employed in making the ordinary troweled mortar joints, provided they learn how to start in the right way.

Printed instructions illustrated by still photographs have been circulated to the Bell associated companies explaining how to join conduit by the new method. Such written descriptions, however, have not proved to be altogether satisfactory in conveying an adequate idea of just how to

Fig. 5. Taking a Motion Picture Illustrating the Making and Applying of Mortar Bandage Joints to Serve as Instructions to the Men in the Field.

handle bandages to make the job easy, of the most desirable consistency of mortar, or of just why it is important to make bandages with the particular form of construction shown in Fig. 2.

To illustrate more vividly, therefore, certain of these important features of mortar bandage construction and use, a talking motion picture has been made by the laboratories for circulation to the associated companies by the American Telephone & Telegraph Co. This is the first case of what might be called "Animated Handbook Instructions for the Construction of Outside Plant." Fig. 5 shows the filming of this picture at Chester, N. J.

What Operators Want to Know

Instructions for Transferring Long Distance Calls—Transfer Should Not Be Made Unless Authorized—Importance of Passing Complete Details to New Toll Center—41st Installment

By Mrs. Mayme Workman,

Traffic Supervisor, Illinois Telephone Association, Springfield, Ill.

Sometimes, after placing a long distance call, the customer finds that it is necessary for him to leave for another town before the call is completed. In this case he may ask the operator to transfer the call to the town where he is going so that he may talk to the called party from there.

If you receive a request of this kind, and the station from which the calling party will talk is served by another toll center, enter "wt (place and number from which the calling party will talk) chg to (calling number)" under the last entry on the ticket and refer the call to your supervisor.

It is not always possible to comply with the customer's request to transfer a call. If the town to which the customer wishes the transfer made is served by another company, this transfer may not be authorized, due to complications in billing which might arise. If the toll center is one to which the transfer of a charge is authorized locally, the supervisor will enter "ok" and her personal number following the number in the calling "telephone number" space, and she will tell you to proceed with the call.

After the supervisor has approved the transfer, ask the calling party what time he would like you to try the call, enter the specified time on the ticket, and release the calling line.

Then reach the new OTC TX, announce that you wish to transfer a ticket, and pass the complete details of the call, being careful to include the number at which the calling party will talk at the new OTC and the number to which the call is to be charged.

If a chargeable report has been given, pass it to the new OTC TX with the report charge and enter "no rept chg" in the "Report" space. Also pass the subsequent attempt time and the number of the point-to-point position at your office at which the call would normally be handled.

As soon as acknowledgment is received, clear the toll circuit, enter, "transferred to (new OTC) (time)" under the last entry and "cov" on the face of the ticket at the top and file the ticket.

If a report charge or a messenger charge has been incurred, before releasing the calling party, tell him that if he is not reached at the new calling station, it will be necessary to bill the charge against the original calling number.

If transfer is to be made to a new OTC and you would normally leave word but have not yet done so, in leaving word say, "Please notify Mr. (called party) to call the (name of new OTC) operator."

If word has already been left, reach the called station and say, "This is the (name of your office) operator. I left word for Mr. (called party) to call, but the call for him has been transferred. Please notify him to call the (name of new OTC) operator instead."

When you pass the details of the call to the new OTC TX, tell her that you have left word for the called party to call her office.

Never transfer a call unless you are sure the transfer is authorized.

Questions from Illinois Operators.

1. What is the proper procedure upon receiving an "LF" report?
2. Should the TTC let the OTC hear her order number over call circuit?
3. When a "da" report is given and subscriber insists on the operator ringing again, what report is given; that is, what phrase is used?
4. When a ticket is transferred to another office, is the entry, "Transferred to (other office)" entered in the space for reports or in the "Special Instruction" space?
5. If you use the CLR method, should you connect the calling party while you are putting the call through?

For answers to these questions from real Illinois telephone operators, turn to page 54.

COMING CONVENTIONS.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, April 12 and 13.

Kansas Telephone Association, Jayhawk Hotel, Topeka, April 19 and 20.

Wisconsin State Telephone Association, Loraine Hotel, Madison, April 26, 27 and 28.

United States Independent Telephone Association, Southern District, Bristol, Tenn., May 4, 5 and 6.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 11 and 12.

Pennsylvania State Telephone & Traffic Association, Penn-Harris Hotel, Harrisburg, May 17, 18 and 19.

Up-State Telephone Association of New York, Jamestown Hotel, Jamestown, May 26 and 27.

North Dakota Telephone Association, Hotel Powers, Fargo, May 26 and 27.

Should Plant Improvement Be Done Now?

Some Fundamental Characteristics of United States and Relationship to Telephone Industry—Possibilities Favoring Carrying Out Work Now as Compared to Later—Address at Annual Convention of Nebraska Telephone Association

By Harry B. Porter,

Plant Extension Engineer, Northwestern Bell Telephone Co., Omaha, Neb.

Toward getting a broad perspective for our use in this review of the propriety of making plant additions and improvements, we might properly devote a little time, I feel, in reviewing certain fundamental characteristics of our United States and their relationship to the telephone industry, and hence investments made in this industry.

The first of these national characteristics is that in our United States, society is organized on the so-called capitalistic basis. We are, I assume, as a group of telephone men, in sympathy with this form of society which has for its basic precept that the maximum overall good is obtainable through stimulation of private initiative.

Dr. Glenn Frank, president of the University of Wisconsin, recently made a talk in which he stated that if capitalism is to endure, it must become mass conscious as contrasted to money conscious. He further stated his belief that "the first function of industry is to feed, clothe and shelter mankind, and once these minimum necessities are provided it is the further function of industry to make materially feasible the conquest of leisure and loveliness in the life of the masses."

Dr. Frank sees such a capitalism emerging out of our western civilization. In 1929 he estimated that approximately one-fifth of the economic enterprises in the United States were operating under the policies of this new capitalism. Out of observations which you and I have made we can find much support for the belief that the telephone industry is a leader of leaders in making progress toward the new capitalism pictured by Dr. Frank.

The application of this general characteristic to the propriety of making specific plant additions at this time will be covered in more detail later.

The second of our national characteristics is, as one writer has expressed it, that our ways are the land ways of a great continent. Further, that the symbol of our rise to fortune is the blazed trail and the "covered wagon." The "covered wagon" is very closely associated with the history and development of our state of Nebraska.

As we constantly see the symbol of the covered wagon on our state roadway markers, we should sense its significance, not only as the symbol of our own state but also of our United States. In this connection it should be appreciated that land ways such as ours, particularly in an industrial age, are conducive to large telephone developments.

The wheels of this covered wagon suggest the third important characteristic of our nation; namely mobility—"civilization on wheels." Mr. Dennis in his very excellent book, "The Romance of World Trade," makes a statement that American business is dominated by the mobility complex. He further states that this struggle for mobility in its essence is nothing more than the age-long struggle to conquer time and distance.

Make Your Job Your Friend.

The hard thing in life is not to make the money needed for happiness, but to find the job you can do best. I suppose that some men never really hit upon their vocation. But, broadly speaking, the right job for every man is the thing that he must do next.

I doubt whether many of us ever pick our jobs; we just happen upon them, or they happen upon us. Presently we get acquainted with each other and both decide that the other fellow will do pretty well.

That is the way to know your job. Make it your friend. Invest it with a personality, and give your job the chance that you would give your friend. Do not cheat or skimp it; be loyal and zealous and your job will reward you with every joy of friendship.—Samuel M. Vauclain.

Is it not perfectly natural that the telephone industry, directly engaged in the elimination of time and space and the bringing about of extreme mobility to speech and thought, should have attained such remarkably inherent stability even in such times as these? The telephone industry is in tune with the underlying spirit of mobility of American business.

It is interesting to note that mobility is attained through transformation. In the telephone business voice energy is transformed into electrical energy and transmitted at speeds approaching that of light and then again transformed into speech. In industry in general, mobility is attained through the same means. Our own great stockyards in Omaha in reality constitute great transformer stations by means of which mobility is given to our agricultural industry through such transformation as of hogs into pork and lard.

Mr. Dennis points out that the underlying philosophy of American business under this mobility complex is to do things better than they have ever been done before and to do them more quickly.

This philosophy is also essentially that of the telephone industry. You will all recall that in bringing about the improvements in the telephone industry looking toward improved telephone service, it appears to be a characteristic of the telephone industry to keep special emphasis on one particular phase of the business along with the maintaining of a balanced relationship between the various parts.

The idea of concentrated attention on one item appears to have been a very successful one in making sustained progress in the telephone industry. It appears that these items to which special emphasis are given are generally quite closely associated with the current or future needs of the business.

During the past ten years you will recognize a number of these items to which special emphasis has been given. Right at the close of the World War the provision of material and its manufacture was of great importance. Then improved technical service, both as to quality and speed, was given special consideration; then, in turn, the matter of an improved operating personnel, personalized service, and so on up to the present time at which sales is being given special consideration, and in our own state I think we might add the rural service problem.

If I were to predict one of the next items to be given special emphasis, I should set down the item of investments, as referring specifically to the matter of making plant additions. So it is timely, I feel, that we review this important subject at this time.

The importance of the matter of plant additions arises, it would appear, out of at least three basic characteristics:

First, plant additions become an important factor in determining the plant investment upon which reasonable net telephone earnings must be made if we are to continue as a going business concern; second the permanence of investment, when made in depreciable telephone property, is of great significance; and third, the inflexibility of investments, when once made, is an important factor insofar as offering an opportunity for any measure of control in the operation of our property during such times as the present.

From the preceding general background we should come out, I feel, with a renewed confidence in the inherent stability of the telephone business as well as its close association with fundamental characteristics of our United States. From these general considerations we should obtain a positive answer to the general question of why make any plant additions at all in our industry.

When it comes, however, to specific consideration of the question as to whether we should make plant additions at this time, these general considerations must give way to specific ones. In considering the question of whether plant investments should be made at this time we might properly answer the following major questions:

1. Are plant additions necessary to the provision or maintenance of an appropriate grade of telephone service for the community involved? If so, does their completion at this time offer opportunities for securing a sound plant investment, the benefits of which will be in effect over a long period of future years?

2. Have the telephone earnings of the telephone property in question been such, during the past years, as to permit the making of additional investments in the property and the earning of a reasonable return thereon, or even the earning of a reasonable return upon the additional capital expenditures involved?

3. Can the operating results be substantially improved through taking advantage of technological improvements in the telephone art which require additions to plant?

4. Will the carrying out of the work at this time fit into an overall program of employment stabilization?

When to Defer Building.

Considering these specific questions in turn, it appears that if plant expenditures are not necessary to the provision or maintenance of an appropriate grade of service for the community involved, then certainly these should be deferred.

On the other hand, after a careful survey of the situation, if plant additions do appear necessary to the maintenance of an appropriate grade of telephone service for a community, then it is interesting to note some of the possibilities that are present favoring the carrying out of the work at this time as compared to a slightly later date.

Someone has made the statement that the 1932 dollar has a general purchasing power in commodities equal to $1.50 of the 1929 dollar and will only be worth 75 cents of the dollar which will emerge when business conditions return to normal. Without attempting to give undue credence to the latter point, there are many reasons to believe that a lowered purchasing power of the dollar will result in the near future, which factor has been taken into consideration, I feel, by many of us in our own personal purchases at this time.

Prices of certain telephone apparatus and material also reflect the general trend of commodity prices at this time. Let us assume that, in going ahead with a telephone project at this time under the foregoing assumptions, a building is required; further, that this building can be built at a cost of $75,000 now as compared to $100,000 at a slightly later date; or in other words, that 75 cents expended in the building at this time will cost us $1 at a later date.

Annual Carrying Charges and Savings.

The annual carrying charges associated with the saving of $25,000 to be made in this building might be expected to be in the order of $2,300 per year. It is interesting to note that the present worth of this annual saving at 7 per cent interest over the estimated 35-year life of the building, amounts to not $25,000 but almost $30,000; and that the cumulative worth at the end of 35 years of $2,300 laid aside at the end of each year, reaches the enormous total of approximately $320,000.

It should be noted in this connection that the present worth of the annual savings, assuming them both to be real and reasonable as appears probable, are about equal to the present worth of the total carrying charges estimated at 12 per cent on the new $75,000 building or $9,000 for a period of approximately 4 years.

Thus it will be seen that real consideration should be given to the securing of a sound investment in a telephone property over a long future period through consideration to doing this work now where, in the continued operation of this property, it appears that plant additions are required at this time.

Where the telephone earnings have not been such as to permit the earning of a reasonable return upon the property, or upon the additional new money required, then these types of projects should be deferred from a standpoint of efficiency and sound economics.

There are a number of cases with which you are all familiar where the telephone industry has made additional investments under these very conditions; and in so doing has, it seems to me, made recognition that the industry has recognized the social service obligations referred to by Dr. Frank as well as the money side.

Types of Projects; Economies.

Considering next the type of projects which make possible improved operating results, it seems to me that this type of project should be carried out as soon after the economies of the project have been reasonably well established as an orderly business procedure permits. This might be illustrated by a hypothetical case where a company by an expenditure of $10,000 is able, through operating savings associated with this project, to provide not only for the increased carrying charges on the new investment, but also to effect a further substantial saving in operating expenses.

This type of problem quite generally involves a question of almost equal importance to the one of whether it should be done now, namely, are the indicated savings real savings? In other words, are we talking about real dollars when it comes to the estimated savings?

Out of my own experience, I have drawn up a schematic which illustrates this type of problem. To many of you who have grown up in the telephone business this problem will appear extremely simple; and so it does to me at this time.

In considering the struggle which I personally had in earlier stages of the game to fully understand the overall consistency of the thing, perhaps it is worth while reviewing, since it does bring out the difference between real dollars and the dollars which might presumably be reflected upon our books. Both methods are correct and proper when understood in the light of the manner in which they are made, and the purpose for which they serve.

Analysis of Illustrative Case.

Here's a case in question in which a $50,000 expenditure will make possible the retirement of $80,000 in an existing though other type of telephone plant. From a bookkeeping standpoint it is obvious that at the completion of this transaction we will have $30,000 less investment in our telephone plant, and that the total annual carrying charges associated with this reduced different type of plant investment, involving among other items depreciation, maintenance and taxes, might normally be less than were previously reflected with the old plant in service.

This transaction might appear, from an accounting standpoint, therefore, as a good proposition. When reasoning is applied to it, however, it must follow that the way to make money would be to replace all of the plant with a type of plant which could be constructed for less money or have smaller carrying charges than that now on our books. You all appreciate, of course, the fallacy of such a premise.

Here, however, is the way this transaction might appear when looked at from the standpoint of real dollars; particularly when considering the propriety of making an additional investment of $50,000 in this plant:

This $50,000 investment in plant might be expected to involve additional annual carrying charges of 13.73 per cent, including depreciation, taxes, maintenance and an interest charge of 7 per cent which, on an engineering basis as this is known, is recognized as a proper charge when considering the expenditure of new money in plant investment, just as it is when we give consideration to making personal expenditures.

This annual cost might be approximately $6,865, against which the only credit that it might be possible to make against the plant of retaining the present plant would be the saving of $104 taxes on the old

plant. Possibly not even maintenance could be reduced in a practical look at this project, assuming the new plant were to be placed.

On this basis, a net cost in real dollars of carrying out this project might be expected to be a penalty of $6,761 per year as contrasted to an indicated saving on the books of $2,913, a total difference between the two methods of calculation of $9,674. The important thing for us to appreciate is that the dollars, as computed on the engineering basis nearly $6,761, are the ones to which we should tie to in determining if a given project is economical or uneconomical.

Considering now the last specific question: Will the carrying out of a program at this time fit into an overall program of employment stabilization? This question really brings out, first of all, the need of a plan.

This can be illustrated by a recent announcement which I saw in a magazine, stating that a telephone company proposed to go ahead with a large expenditure of money at this time since the expenditure of this money and employment of labor associated therewith would have a more beneficial effect than if carried out at a later date.

However, this overall project had been considered from various angles, and in the carrying out of it, there was considerable latitude. As a result of having a plan it was possible to bring this project forward on a sound basis from the original time of installation to the present.

In this connection it seems to me that the Nebraska Telephone Association could do nothing more profitable than to give consideration to the development and coordination of plans within the industry in our state, working toward the objective of minimum variations in employment conditions within the industry itself.

While consideration of these specific items will give general guidance to the question of, why do the work at this time? it has been assumed, of course, that financial conditions will permit the securing of money for the carrying out of those projects which should be carried out now. A further check of the soundness of our conclusions is, of course, obtained when it comes to obtaining money for doing this work or in securing authorization for the expenditure, assuming that money is or can be made available for the purpose.

Almost as important, it seems to me, as the determining of whether the project should be done now and its effect upon the investment in telephone property, is the answering of the specific question of why the work should be done in the manner recommended. This essentially involves a plan of procedure.

Good planning necessitates the coordination of current plant additions with those that will be required in the future. Only in this manner can the lowest overall plant investments be obtained. A map, properly colored, ofttimes offers a convenient means of recording the plans for the future development which are contemplated in connection with current plant additions. This map, in presenting a picture in which the overall relationship between parts and the whole can be quickly seen, provides a check on the basic soundness of current projects.

By keeping such a map up to date a future plan is available which will greatly assist in making current plant additions which are in line with the future objectvie plans of plant development.

The fact that the telephone industry is so closely associated with the mobility of American industry gives rise to a further need for very careful consideration of the trend of the times in the making of plant additions. Small towns are growing smaller. The rural population is decreasing and may be expected to decrease during the ensuing years as a result of the technological and management improvements going on in the agricultural industry.

Plant additions almost inherently create margins of spare and it becomes necessary, in view of these trends, to make sure that these margins of spare are kept at their practicable minimum. This may in small properties result in the difference between operating at a loss or at a small profit.

My admiration for one of the engineers directly charged with the responsibility of plant investments has been won by his recognition of these trends and the insistence upon a solid low cost plant investment. He withheld approval on a job, involving additions to a small telephone property, for a considerable period after the general propriety of going ahead with the job at this time had been established.

This was done in the belief that the permanent aspect of the investment made it essential that this investment be kept to a minimum and that an appropriate grade of telephone service could be furnished to the particular community involved through the working out of a plan involving less margin and more close consideration of the probable future needs of this community.

Out of my own experience in engineering small exchanges, there are many 50-pair cables in place where, if I were to do the job over again, with a better recognition of these general ideas back of the mobility of American business, I should be inclined to place 25-pair, or perhaps even smaller if such were available. Nevertheless, these cables are still in place with margins of spare to provide for growth which, as I see it now, they shall never be called upon to take.

From all of these considerations, touching upon the questions of why do the job at all? why do it now? and why do it in the manner recommended? you will appreciate that only general guides have been given as an aid to individual judgment in arriving at the final answer to these specific problems.

You may feel that there is an inconsistency in arriving at the general conclusion that we should go ahead with jobs perhaps involving temporary technological employment and at the same time give consideration to the carrying out of jobs now for the purpose of employment stabilization.

These two views are entirely consistent, it appears, if we will go back to what the function of business should be under our present organized type of society.

Mr. Whitehead in the introduction to the book, "Business Adrift," has said this especially well, in that he believes that the peculiar function of business in an individualistic society is to develop efficiency in control of nature and in management, upon which alone progress may be based. Further, he states that business should stick to this job of efficiency, for the only justification of a capitalistic society is that it should permit us to obtain more through the stimulation of private initiative than under any other form of society.

All of us must, in the final analysis, make our own recommendations upon consideration, as outlined, of such factors; and, to the degree that we are able to develop the future business mind, we shall be successful.

In concluding this review, I should like to present Mr. Whitehead's definition of the future business mind. He says that the future business mind is one which recognizes that the two greater factors facing us at the present time are the need for stability or routine as the basis of organized society, and the effect which the factor of rapid change is having toward upsetting this stability.

The future business mind, he concludes, will be one which understands routine, is capable of constructing it, of conforming to it and of supervising it, for upon routine rests the bedrock of all practical efficiency. Routine has its limits, and it is for the discernment of these limits and taking the steps for subsequent action that foresight is required.

The development of the required foresight demands a reflective or philosophical mind capable of understanding the flux of human societies—one that is capable of eliciting generalizations from particulars and recognizing divergent illustrations of generalization from divergent circumstances.

Keep Old Customers.

It is easier to keep old customers than to get new ones.

Never let a customer quit without finding out the reason why and taking measures to prevent another customer leaving for the same reason.—William Feather.

Transmission in the Telephone Plant

Discussion of Problems in Magneto Exchanges Which Concern Transmission Performance of Equipment—Part III, Outside Plant Maintenance—Illustrated Address Before Annual Convention of Minnesota Telephone Association

By H. B. Nelson,
Northwestern Bell Telephone Co., Minneapolis, Minn.

Let us now consider the outside plant that connects the central office with the local subscriber. In the average town equipped with magneto instruments the subscriber's loop rarely exceeds a half-mile in length in the immediate town area. In an exchange of this type the transmission loss due to the distributing plant rarely exceeds ½ db in the town areas. Where excess losses occur they usually will be found to be caused by poor maintenance conditions in the plant.

Constructed, as it is, largely along the highways, and because it is subject to various kinds of outside interference, the problems surrounding its maintenance are numerous and somewhat difficult. It is, therefore, necessary when laying out new plant or minor extensions, that great care be used to so locate that plant insofar as possible to avoid hazards that will cause mechanical and electrical injury to the plant.

This practice may in many cases increase the initial cost, but over a period of years will result in lower total costs and a higher grade of service.

It has been the practice in many exchanges to care for outside plant troubles only as they occur and are reported by the subscriber. This practice is sure to produce increasing complaints as the plant ages, and soon necessitates an expensive rebuilding program.

Preventive maintenance has as its object the keeping of the plant free from service hazards, safe for workmen and the public, and to keep the plant in practically the same condition as when it was constructed. When properly carried out this practice removes the causes of conditions that will sooner or later affect transmission and result in service interruptions.

Generally speaking, a yearly inspection will accomplish the results sought. The best time for making this inspection is in the late winter and early spring after the period of extreme contraction has taken place and before the spring rains set in.

The most important items to inspect for in each major part of the plant are listed in the accompanying table. Notes should be made of all the defects found during the annual inspections.

Note that the item of "clearance" appears in three of the parts—cable, drops and open wire. The clearance from trees and other obstructions, from electric light wires, and over streets and roadways, may change from time to time due to various causes. Hence this item should be carefully watched.

A better understanding of conditions that should be cared for can best be obtained from pictures which were taken of outside plant before and after preventive maintenance measures were applied.

Fig. 29 shows an alley distribution cable which had been in service for about 15

Poles and Crossarms:
1. Condition of timber.
2. Properly guyed.
3. Alignment.

Cable:
1. Tree clearance.
2. Slipped or defective rings.
3. Creeping and excessive slack.
4. Cracks and cuts.
5. Splices.
6. Clearance from electric light wires.
7. Clearance over streets.

Terminals:
1. Condition of the shank.
2. Cover.
3. Terminal face and lugs.
4. Drop wire entrance to terminal.

Drops:
1. Condition of wire.
2. Attachments.
3. Clearance from trees and other obstructions.
4. Clearance from electric light wires.
5. Clearance over roadways.

Open Wire:
1. Condition of wire.
2. Slack.
3. Pins.
4. Glass.
5. Ties.
6. Clearance from trees and other obstructions.
7. Clearance from electric light wires.
8. Clearance over roadways.

A List of the Most Important Items Which Should Be Inspected in the Three Major Divisions of Outside Plant Equipment, During Late Winter and Early Spring.

Fig. 29. View of an Alley Distribution Cable Which Had Been in Service About 15 Years But Had Not Been Properly Maintained.

Fig. 30. Another View of the Alley Distribution Cable Pictured in Fig. 29, Showing the Particularly Bad Tree Condition.

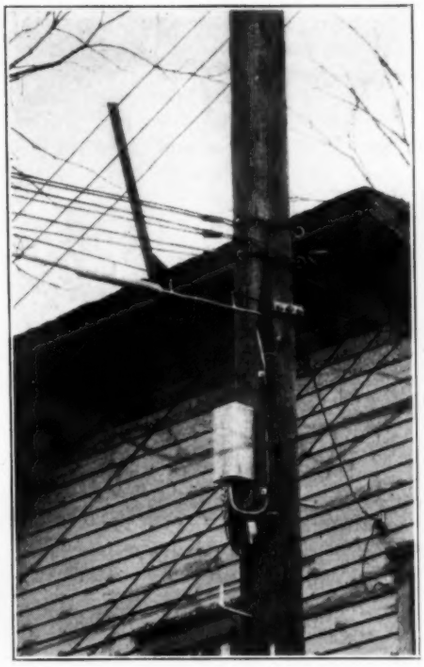


Fig. 31. Many Poor Conditions Exist and Cause Poor Service on a Terminal Pole Such as This—Fig. 32. The Same Alley Distribution Cable as Shown in Fig 30 After Conditions Were Corrected—Fig. 33. When the Terminal Pole Conditions Shown in Fig. 31 Were Remedied and the Cable and Wires Properly Placed, the Pole Presented a Much Neater Appearance.

years. The real condition of the poles does not appear in the picture, nor can it be determined except by actually digging around the butt of each pole in plant of this type, because the cable strand and drops support the poles. Inspection of the poles in this alley revealed that two-thirds of the poles were rotted off at the butts.

Conditions of this kind place an excessive strain on the drops and cause the ties to cut the insulation. This results in leaky drops during wet weather, which is a serious hazard to good transmission. The cable strand had at least 18 inches of slack in this block and resulted in the cable creeping and forming loops between the rings.

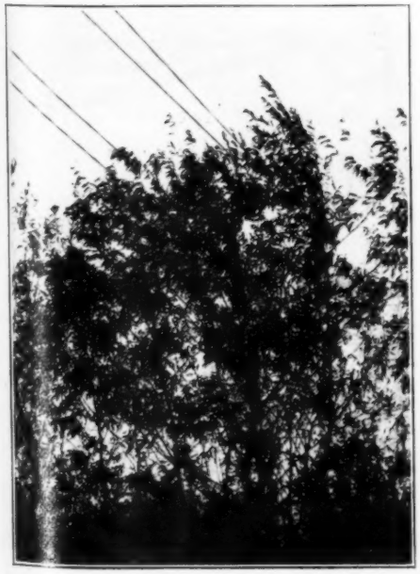
Another photograph in the same block, Fig 30, shows that tree conditions were particularly bad, and as a result the supporting rings were pushed out of place. This permitted the cable to sag down in loops at the ends of which deep ring cuts formed in the cable sheath, making it necessary to replace over 50 feet of cable.

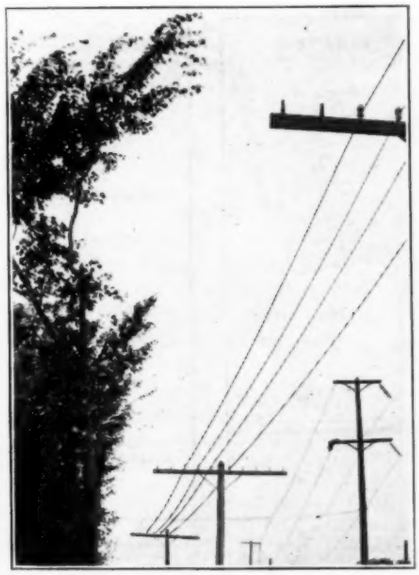
The ties supporting the splices were also broken off and sooner or later would have resulted in cracks developing at the ends of the splices.

Conditions at the end of terminal pole are shown in Fig. 31. As the result of tree interference and a slack cable strand, the cable crept away from the terminal pole. This caused the lashing on the splice to break and the terminal shank to crack where it was pulled sharply over the clamp at the pole.

The drops were in a particularly bad condition at this pole. Not only had the insulation been badly damaged by rubbing on the trees, but slack and loose ends at the terminal were unsightly and no doubt had been responsible for several interruptions of service.

A general view of the alley cable lead





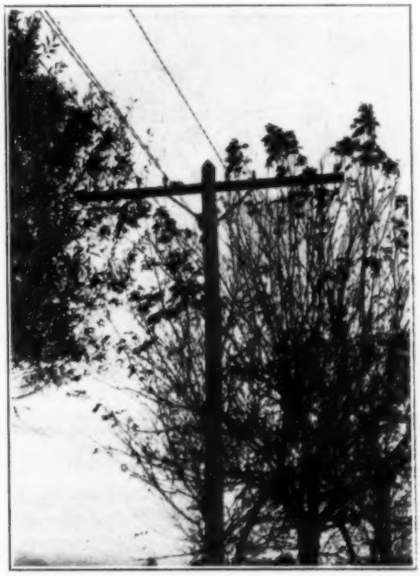


Fig. 34. Swamp Willows and Other Rapid Growing Trees Are Often Allowed to Create Bad Conditions on Open-Wire Leads—Fig. 35. The Same Leads as Shown in Fig. 34 with the Bad Tree Condition Eliminated—Fig. 36. Ornamental Shade Trees May Also Cause Heavy Leakage on Lines, Especially in Wet Weather, If Allowed to Grow Unhampered.

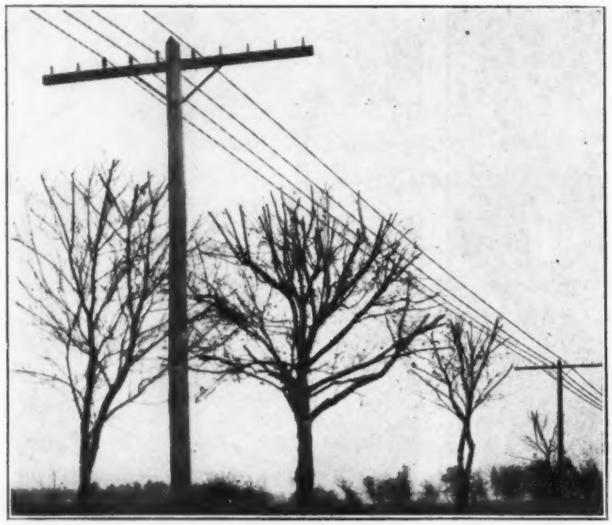


Fig. 37. A View of the Leads Shown in Fig. 36 After the Trees Had Been Trimmed.

after the various tree and cable conditions described were remedied and repaired, is given in Fig. 32.

The poles were lowered at the butts, the excessive slack pulled and cut out of the cable and supporting strand. The trees have been neatly trimmed and should cause no further trouble. Defective drop wires were replaced or repaired.

Fig. 33 shows conditions at the end terminal pole on completion of the work. A new terminal was necessary on account of the broken shank, defective drops have been replaced and the trees trimmed so as to give permanent clearance.

As a result of this work, together with a definite periodic inspection, the plant may be reasonably expected to give efficient service for a number of years; and a yearly inspection will prevent the recurrence of the condition, shown in Figs. 29, 30 and 31, so detrimental to good service.

An open-wire lead, buried in swamp willows, is seen in Fig. 34. This condition is to be found on many rural leads and results in heavy leakage and swinging crosses which make dependable telephone service impossible.

Permission was obtained from the abutting property owner to entirely remove the trees from under the lead. A view of the pole line on the completion of the work is given in Fig. 35.

Under a yearly patrol plan this lead can now be kept clear with but very little effort, and the costly labor of cutting and burning heavy brush will be avoided.

In Fig. 36 is shown the same lead where it passed through a number of ornamental shade trees in front of a farmer's residence. Again we have a condition where heavy leakage will result from the open wire being in contact with growing trees. The force of the branches blowing against the wires has broken off one of the crossarm pins. This resulted in a crossed line and interrupted the service on two circuits.

Trees of this type

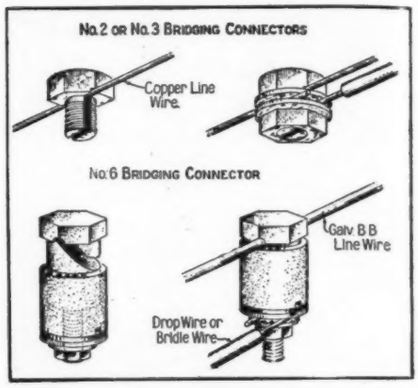
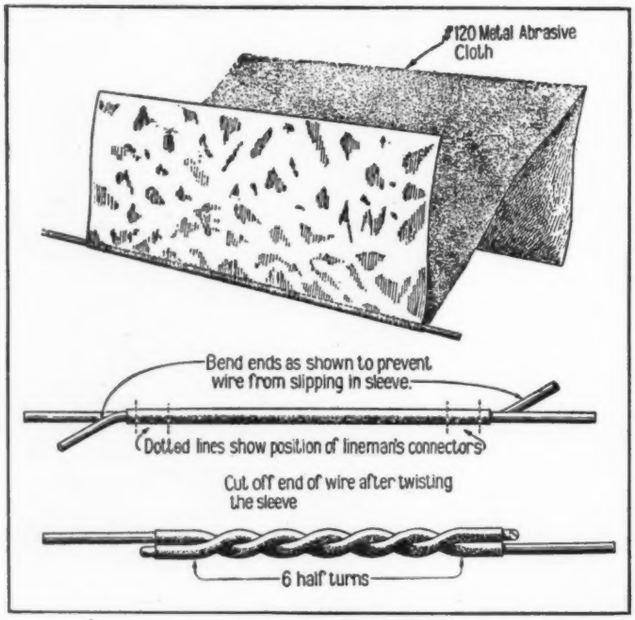


Fig. 38. Types of Bridging Connectors Widely Used.

can seldom be removed and must be handled by trimming. In this case, permission was obtained from the farmer to trim his trees so that a clearance of from four to six feet was obtained between the open wire and the highest branches.

The completed job of trimming is shown in Fig. 37. The trees have been rounded up symmetrically and the brush and suckers removed from the lower branches and tree trunks. This manner of tree trim-


#120 Metal Abrasive Cloth
Bend ends as shown to prevent wire from slipping in sleeve.
Dotted lines show position of lineman's connectors
Cut off end of wire after twisting the sleeve
6 half turns

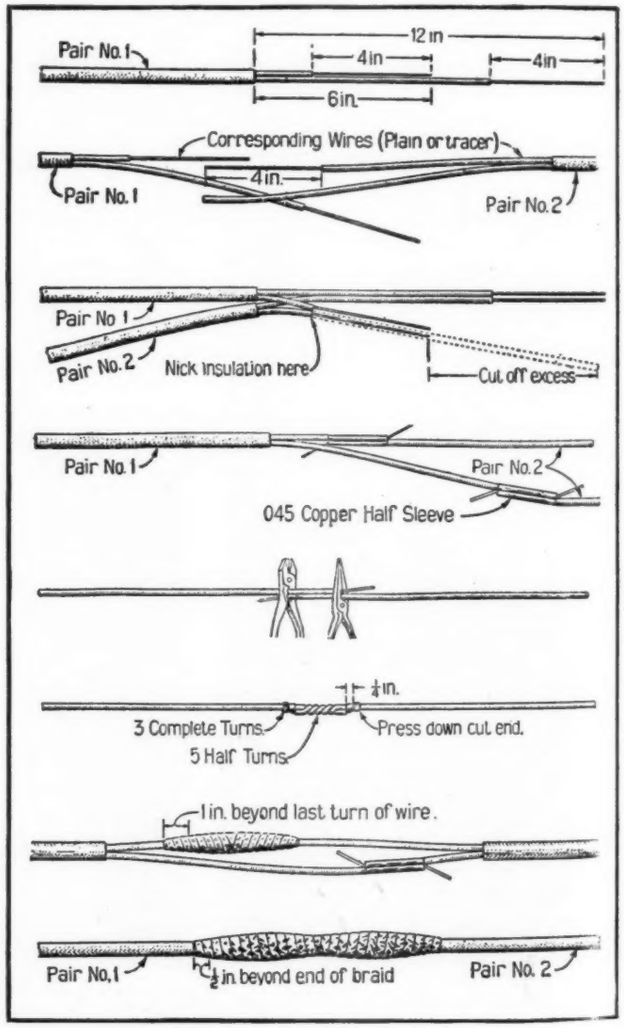


Fig. 39. Procedure for Making a Good Open-Wire Splice—Fig. 40. Method of Splicing Parallel Drop Wire.

ming reflects credit on the telephone organization and makes it easier to obtain permission from the property owners to do the work.

Loose connections are probably the greatest source of transmission trouble in outside plant. These are usually the result of poor wire splicing or the use of the wrong type of bridging connector.

At cable terminals where iron wire terminates, permanent connections between the bridle wires and iron wires should be soldered or sleeved.

While the use of bridging connectors is permitted for such work, only that type of bridging connector should be used which is equipped with a galvanized iron surface for the open wire end and a brass or copper surface for the bridle wire end.

All brass or copper bridging connectors, when used at the junction of copper and iron circuits, become corroded in a very short time due to the chemical action between the two different types of metal. This corrosion sets up a high resistance joint that will cause a high loss in transmission.

Fig. 38 shows two different types of bridging connectors widely used. The No. 2 and No. 3 are made of heavy brass and are used for bridging two copper wires together. The No. 6 bridging connector is equipped with a galvanized iron surface at the top to connect with the iron wire, while the bolt and washers at the bottom are of brass to connect with the copper wire. The galvanized iron and brass bolt are welded together to prevent any chance of chemical corrosion.

Another type of bridging connector similar to the No. 3 is made entirely of galvanized iron and is used when it is necessary to bridge two iron circuits together.

In spite of these precautions in design, bridging connectors develop high-resistance, corroded joints. In order to prevent transmission losses, bridging connectors should be removed and the wire and connecting surfaces cleaned at each inspection.

In splicing open wire, splicing sleeves should always be used. Hand joints are always a possible source of high resistance and poor transmission. They should be cut out of the plant when picked up during the inspection.

In splicing open wire, the wires should be thoroughly cleaned with abrasive cloth before being placed in the sleeve. Bend the dead end of each wire after slipping it in the sleeve and then place the connectors on the sleeve near each end. Six half turns are made, after which the dead ends of the wires are cut off. Fig. 39 illustrates this method of splicing.

In splicing parallel drop wire, the splices on the two wires are staggered. The different steps in the splicing operation are shown in Fig. 40.

(To be continued)

SMILING DOORS

By Miss Anne Barnes,

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

A door may be either an entrance way or a barrier, depending on the folks who live behind it.

The pioneers who crossed the plains in covered wagons soon learned to know the difference between the two kinds of doors. One can imagine them peering hopefully from their wagons for the first sign of human habitation, other than that of Indians. How eager they must have been as they approached the little log cabins which lay many, weary miles apart.

When they neared one of these little log-cabin homes where flowers grew in gay, riotous beauty about the front entrance, they knew they would receive a glad welcome from the folks living in it.

What a cheery sight it must have been for the weary, homesick travelers to see the very same kinds of flowers they had left back home, growing so radiantly in the wild, unbroken country. It gave them new heart, I am sure. It was intended as a good omen by those who put the flowers there.

It must have been indeed disappointing, after long, weary hours of traveling to get the first glimpse of a log-cabin home barren of flowers. What did it mean?

"Perhaps we had better not stop," someone probably suggested, to which others agreed. So rather than risk a sordid, hard, bitter interview, they drove on hoping and praying they would come to one of the *smiling doors* before many more miles.

We feel that way about folks today, don't we? We would go out of our way to meet the ones who always seem cheery, whether they live behind big, beautiful, broad doors or little flower-decked shanty doors. We avoid folks, when possible, who seem hard or bitter, because if they do invite us into their lives it is to complain or to try to influence us against someone.

The drops on our switchboards are the doors to many homes and business places in our towns. Some of them are the doors we are glad to see open, because the folks who live back of them are so pleasant. These are our *smiling doors.*

There are other drops on our switchboards we dread to see open, because the folks who live back of them are sometimes glum and unapproachable. It is almost with trepidation we ring their doorbells when we have a report to pass. Most likely they may slam the door in our faces without so much as, "Thank you."

But, never mind! We do not know how much heart-ache, affliction, and disappointment are back of those telephone doors. Let us avoid adding to people's troubles, fancied or real. We want them all to think of their doors opening into Central as *smiling doors.*

New President for Associated Telephone Utilities Co.

Resignation of Marshall E. Sampsell as president of the Associated Telephone Utilities Co., Chicago, Ill., and appointment of William J. Wardall as his successor was announced on March 30 by the company.

Mr. Wardall was western manager of Bonbright & Co. at Chicago until recently and is a past governor and past vice-president of the Investment Bankers' Association of America.

Harold V. Bozell, an electrical engineer, former editor of Electrical World and for the past several years also associated with Bonbright & Co., was made executive vice-president of Associated Telephone Utilities Co. At both Yale and Oklahoma universities he handled courses in telephone engineering and in utility operation and management. He also has been in consulting engineering work which included a practice with telephone companies.

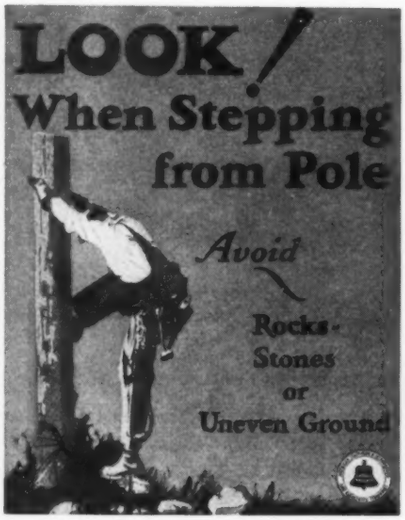
Both Mr. Bozell and Mr. Wardall were named directors of the Associated company.

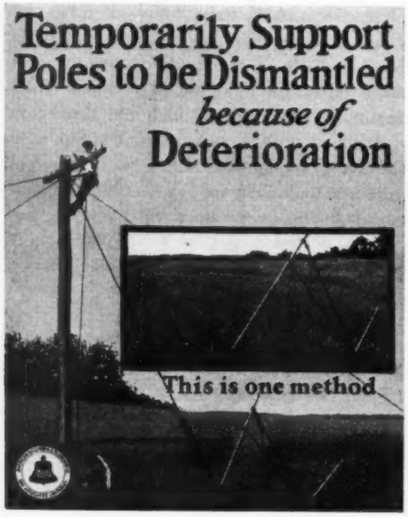
The two vice-presidents of Associated Telephone Utilities Co., S. L. Odegard and J. F. O'Connell, who have concerned themselves primarily with operating problems of the various operating subsidiaries, continue in those positions.

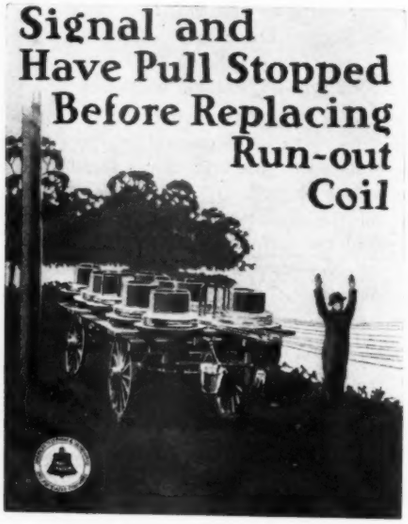
Mr. Sampsell, president of the Associated company since its organization in 1926, said: "The executive problems in connection with the administration of this system have grown many-fold and require more executive time and attention than I can now give to them."

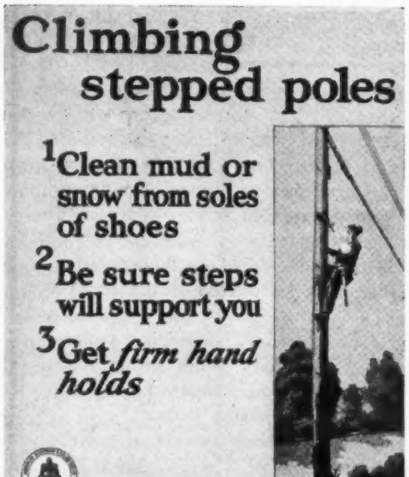
He pointed out that the company has grown from a gross revenue of approximately $2,000,000 in 1926 to almost $18,000,000 in 1931 with operations in 25 states, controlling more than 500,000 telephones.

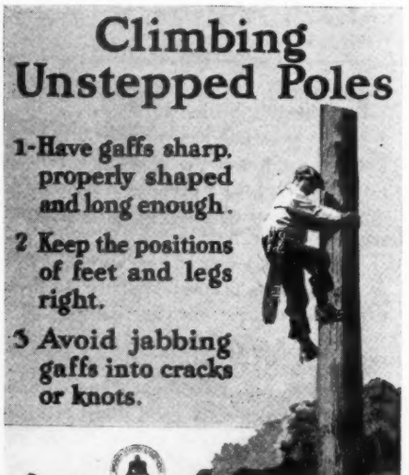
A Page of Safety Practice Suggestions

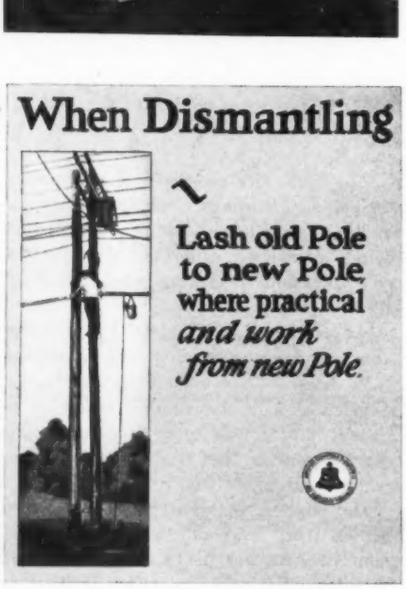


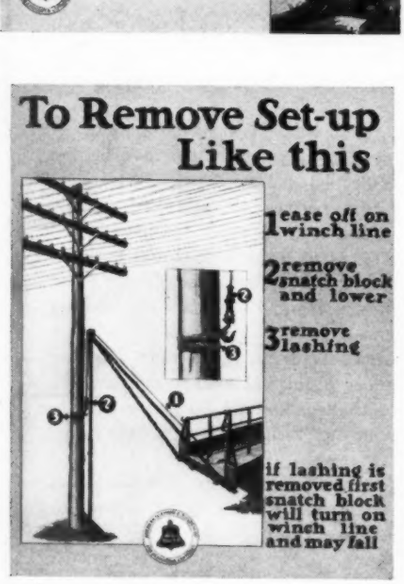


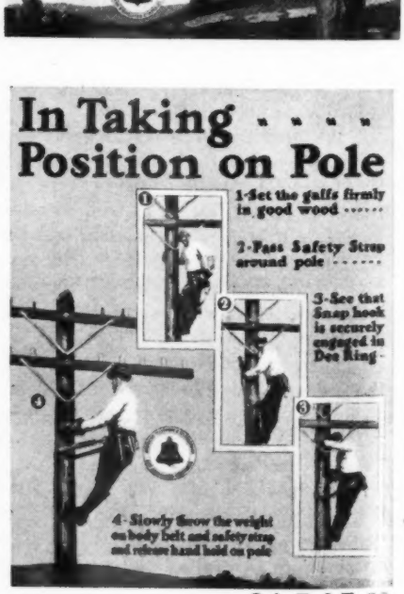





Climbing Unstepped Poles
1-Have gaffs sharp, properly shaped and long enough.
2 Keep the positions of feet and legs right.
3 Avoid jabbing gaffs into cracks or knots.




To Remove Set-up Like this
1 ease off on winch line
2 remove snatch block and lower
3 remove lashing
if lashing is removed first snatch block will turn on winch line and may fall


In Taking . . . . Position on Pole
1-Set the gaffs firmly in good wood
2-Pass Safety Strap around pole
3-See that Snap hook is securely engaged in Dee Ring
4-Slowly throw the weight on body belt and safety strap and release hand hold on pole

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Engineering Aspects of Rural Lines

To Make Rural Line Service Pay It Is Necessary to Have Economical Plant, Well Maintained—In Rehabilitation of Existing Plant, Cost Factor Is Determining Influence on Decisions—Many Expedient Methods That Can Be Used

By F. J. Mosher

The ever-increasing use of the automobile has had a decided influence on the movement of families from the inward sections to the outlying areas of our cities and towns. This movement has forced the extension of good roads and has established new shopping and social centers.

With these activities, of course, there has been the demand for adequate public utilities. Power, water, gas, transportation and communication facilities were necessary or this activity would have been retarded. The rural districts which are in proximity to the larger industrial centers have undergone this change and demanded utility services equally good as the services which are provided within the inward section.

It has been an additional problem for the engineer in the past ten years, to plan and design plant to meet this trend. With the heavy activity in some localities, many unusual requirements have been encountered, and, in most cases, met.

With this fundamental change there has also been the gradual upward change of the standard of living. People travel more, and as they travel they see and use services that were unknown to them years ago. The utility of power, water, rapid transit and communication at first astonished them, but now they are demanding these services in their own homes.

As this trend has spread from the inward sections to the outward areas of the larger centers, so it is now going even farther and into the smaller and rural districts. The farmer who today has his radio and power-driven farm machinery is not going to be satisfied with kerosene lamps or inadequate telephone service.

In the United States there are approximately 2,750,000 rural telephones, and many of them have been sadly neglected. Farmers with no telephone training or experience have formed companies and built telephone lines on fences, trees and native poles. They have placed the cheapest of instruments, and then have allowed the entire plant to deteriorate to a state where good service is impossible.

This neglect of the rural line plant has not been confined to the smaller companies. It is so extensive that today it is one of the major problems of the telephone companies.

It has been known for years that under the generally prevailing low rates—and due to the nature of this rural development being scattered, making the plant cost per station high—the profit from the rural station has been very small. It should be realized, however, that instead of being a money-losing proposition, it can be made to pay.

To make rural line service pay it is necessary to have economical plant, well maintained. It must be serviceable at all times. When stations are out of service for days at a time, that service is not attractive; it is not to be depended upon—and the whole community generally knows it.

The Executive of the Future.

Tomorrow the successful executive will have to know his public. He will need both practical and theoretical knowledge of his product and its distribution, but the extra something that will mark tomorrow's outstanding business leaders will be an ability to feel the state of mind of the buying public.

The future executive will be a master doctor of society, feeling its pulse and knowing its state of health, its mood, and its probable reactions. He must diagnose every social situation and determine its effect on tomorrow's dollar.
—Tomorrow's Business.

The reaction is that there is no demand for that kind of telephone service, and it is not used.

Rebuild a dilapidated lead, put up new wire free from trees, provide good transmission, and the telephone usage in the area will increase. The community will know about it, and when any public relation questions come up there is much in favor of the telephone company. Also good, clear lines mean an increase in your toll business.

Telephone leads have been built in a large percentage of the rural areas, so most of the problems of this type of plant consist of rehabilitation work. Whether or not to use the existing plant is a question which should be given proper consideration.

In any study involving reconstruction or construction of new telephone plant, the cost factor is usually what determines whether or not a certain project shall be undertaken; and in order to keep costs of rural line work to a minimum there are many expedient methods that can be used.

In order to effect the greatest economy, it is essential that the area in which the work is to be undertaken be properly studied before any actual construction work is done. Surveys should be made to establish the proper feeder and distributing leads which will require the least amount of plant. This applies particularly to the rebuilding of existing plant, for oftentimes many miles of pole line plant may be eliminated by proper engineering.

No company should make extensions which will not be profitable; and in engineering, the existing and prospective business should be weighed to determine if the required amount and type of plant to be provided will "prove in."

In view of the large amount of rural power lead construction, one factor which should be kept in mind in rural telephone plant extension work is that much money and time will ultimately be saved by the keeping of the leads on one side of the highways throughout their entirety. Representatives of the power companies and the telephone companies should coordinate their line construction work and agree to the side of the highway which shall be used by each company.

The construction work should not be done on a piece-meal basis, as jobs done now and then are expensive. There are many economies in materials and construction methods which in piece-meal work cannot be realized.

When practicable, farmer teams and labor for the handling of poles and the digging of holes should be used. The farmers will assist in getting local labor. They will appreciate the attitude of the company that will do this rather than to send crews out many miles on an eight-hour-day basis, when the farmer works from 10 to 16 hours a day.

Advantage should be taken of the seasonal and local labor conditions. Many farmers are very glad to get in two or three months' work on pay, after harvest time. This also creates good relations with the farmers and tends to build a greater community interest in the telephone company.

Much more and sometimes better tree trimming can be secured by having the property owner do the trimming work on his own property. This generally also can be done at less cost and without that possible aftermath of a property damage case. The setting of poles back of trees and brush, or the use of short poles and undertrimming should always be considered rather than doing an expensive job of overtrimming with its resultant, periodic after-trimming.

The placing of the crossarms or brackets on the poles before they are erected will save many dollars. The use of short and

small diameter poles placed at as long span lengths as good practice will permit, with thought as to future circuits and the sleet-loading of the area in which the work is to be done, should be considered.

Where jobs are extensive with large quantities of new poles to be set, the use of the earth augur or mechanical pole-hole digger will often more than pay for its cost in hours of labor saved.

It is quite often more economical to place cable than it is to replace open wire with new wire. Cable of the proper size and gauge should always be given consideration in areas directly adjacent to cities and villages.

It is useless to build up a good outside plant and expect to give good service if the central office equipment, station wiring and instruments are not also conditioned. Jumpers on the main distributing frame should be soldered, so that there are no loose joints anywhere. Cords, plugs and jacks should be placed in good condition. Good transmission can not be obtained with the use of loose plugs and noisy cords. The operator's set should be kept free from faults.

The subscribers' instruments should have the proper battery supply. They should be inspected; also the inside wire looked over for loose joints, and the defects found should be remedied.

After the new rural plant is built, it should be maintained; and this can best be done by periodic patrols of the leads. These patrols are not costly and many small defects can be remedied which if allowed to remain and accumulate would, in time, mean expensive repairs. The patrol will also give the workman an opportunity to check his territory and many times, sell additional business, and also do some educational work.

There still remains much to be done to teach the farmer the real value of many of the services. The great convenience of the telephone still remains unknown to a majority of the nearly 40 million farmers in the United States.

The use of proper educational methods, demonstration and explanation, should secure enough additional business to more than offset the cost of this educational work.

Building for Better Transmission

Here Is Excellent Discussion of Why Quality Construction Materials and Good Work Are Economy in Building Outside Plant to Help Assure Subscribers of Better Telephone Service—First Cost Is Not Always the Last Cost

By M. A. Bellion,

Manager, Supply Sales Department, Kellogg Switchboard & Supply Co.

We of the telephone industry are all interested in giving good telephone service. What then constitutes good telephone service?

It has been generally accepted that the subscriber is only interested in the following fundamentals of service: A quick answer, a speedy connection, a satisfactory conversation, a rapid disconnect, and a prompt recall.

Probably the most important in the subscriber's mind is a satisfactory conversation. But to assure a satisfactory conversation, it is imperative that we have good transmission. Then why not build our plants with the object in mind of securing better transmission?

That is to say, construct the entire outside plant in the best way possible, and at the same time watch expenditures so that they are not excessive. Cheap materials and workmanship may effect an immediate saving, but in the end they prove to be a waste of money.

Quality materials in the hands of good workmen are a sure guarantee of economical operation; especially so after a period of time when inferior materials have deteriorated and require frequent servicing and constant care to maintain transmission. It is after a long period of good service that quality materials show their greatest worth.

Practically every item of equipment—both in the central office and outside plant—has a more or less important bearing on the quality of transmission in the system. Obviously we can not discuss them all in this limited space so I am going to mention only a few of the more important outside construction items that have a direct bearing on the quality of transmission.

Constantly Improving Standards.

The modern telephone plant is daily becoming more complex. From the early grounded systems with their limited possibilities, our business has rapidly grown through various stages to its present size.

Cables stretch out and connect cities farther and farther apart. The intricate system of cable and wires, as well as the thousands of construction essentials, all play an important part in the telephone business of today. Where yesterday we were satisfied with certain results, today we are continually seeking to improve our outside plant and setting up higher standards.

Telephone men today are rapidly learning to discriminate between good and mediocre construction for the betterment of their outside plant and transmission. Modern requirements demand modern service. Quite an obvious example can be set up. When the horse and buggy and kerosene lamps were in vogue, magneto telephone lines were constructed, using good old Mother Earth as the return circuit for voice currents.

Power Lines Introduce New Problems.

This practice has been stored away in history's attic along with other relics which no longer are capable of serving the public the way it wants to be served. The old grounded cricuit, of course, is still used in those few and remote sections where telephone lines are free from the inductive interference of high tension currents.

In the early days of telephony, power lines, due to their scarcity, presented little or no interference problem to transmission. Today, however, they cross and recross the width and breadth of the land and thus represent the traditional thorn in telephony's side.

New magneto lines, or those in the process of being rebuilt, are therefore of the metallic or two-wire circuit type to obtain better transmission. Cross interference with metallic lines paralleling power circuits is virtually eliminated by employing the proper methods of transpositions and the use of drainage coils.

Careful Inquiries Before Buying.

Telephone men formerly—that is, when the art of transmission was still in its infancy—knew little or practically nothing about the characteristics of telephone cable. Such terms as electrostatic capacity, mutual and grounded, were just so many meaningless words. Today, however, telephone men are making careful inquiry as to the advantages of double paper wrapped insulation over single paper wrapped; they want to know what benefits will accrue from a service standpoint in the differences of capacities as are present in the various grades of telephone cables.

Furthermore, they are careful to observe the lead sheath thicknesses, for they know, mostly from experience, the effects of the constant vibration and swaying of aerial cable in contact with cable rings. Their experience has taught them that the cable sheath, unless of the proper thickness and alloyed with the correct percentage of antimony, will crystallize and buckle.

Telephone cable is such an important factor in this business of "building for

better transmission" that it would not be amiss, at this point, to quote a few excerpts from a manufacturer's specifications treating on the general subject of electrostatic capacity:

Mutual capacity may be defined as the relation which one wire of a pair bears to its mate, capacity measurement being made while the balance of the wires in the cable and lead sheath are grounded.

Grounded capacity may be defined as the capacity relation which one wire bears to the balance of wires in the cable, the capacity measurement being made while all other wires and lead sheath are grounded.

As the term "capacity" is not fully understood in many cases, these definitions and a further brief explanation are offered. When two or more pairs of wires in a cable are in service at the same time, there is generated or set in motion various electrical currents which act in a greater or lesser degree as a disturbing element to adjacent pairs of conductors. In cables where the conductors are brought very closely together this disturbing element is somewhat noticeable and the capacity is greater than in a cable which contains conductors more widely separated.

As an illustration, take a cable made of 100 pairs of No. 22 gauge wire. Compress it into a space of 1 7/16 inches diameter; this gives a capacity of 0.08 microfarad per mile. Compress the same number of pairs into a space of 1 3/32 inches diameter; this gives a capacity of 0.10 microfarad per mile. Again compress the same number of pairs into a space of 15/16-inch diameter and we have a capacity of 0.12 microfarad per mile.

It is noticed that as we keep compressing the cable the capacity is higher each time, due to the fact that as we bring the conductors closer to one another the disturbing element mentioned is more active. This influence existing between any two or more wires is termed "electrostatic capacity" and is expressed in microfarads per mile of cable. It is an important measuring factor in determining the best cable to use and in balancing conductors to assure good transmission.

Cheap Supplies Are Expensive.

Plant maintenance and the costs involved are today more thoroughly considered than they were in the old days of telephony. On the basis of these cost factors one may draw the line between succeeding or failing to pay the stockholders a dividend from the operation of the company.

Your plant superintendent knows the mechanics of good plant construction. He knows the proper method of making transpositions; he knows the necessity of perfect sleeve connections, and he sees to it that the bridle wires are not causing high resistance losses.

These problems and many others confront him daily but, however important they may be, they are only of secondary significance when compared with the importance of practicing sound economy in the purchase of plant supplies. He, too often, is inclined to consider price rather than the quality factor in attempting to build up the network comprising his outside plant.

May it be particularly emphasized, therefore, that while economy is truly a virtue to be sought, it should not be secured by the sacrifice of quality.

Buy Good Poles.

From the standpoint of "building for better transmission" there is considerable to be said about poles. They may be very aptly described as "Sentinels of Service." It is quite disheartening to find that good money has been thrown to the four winds after a sleet storm has laid low a large number of poles for want of better quality timber.

"First Cost," Says Mr. Bellion, "Is Not Always the Last Cost. Economy Through the Sacrifice of Quality Should Not Be Considered. Quality Construction Materials and Good Construction Work Are the First Requisites in Building for Better Transmission."

Transmission—or it might be better termed, continuity of service—as well as your purse strings suffer. Too much emphasis, therefore, cannot be placed on the necessity and wisdom of purchasing A-No. 1 quality poles. When building for the future, betterment of service is the goal.

Subscribers—and please remember that they are the source of your income—are not only interested in good service but also in good, straight pole lines. They are quick to observe and demand that the appearance phase be considered. Poles that have an ungainly sweep or crook actually detract from the appearance of an otherwise beautiful little community. It is advocated, therefore, that all poles set in the urban as well as the rural districts be classified by approved pole associations which govern the physical specifications of such timber through exacting and iron-clad rules.

Soil conditions and fungus growths make it imperative that the treatment of poles, prior to shipping, be considered. The treating process of today is conducted by modern and scientific methods, which help to insure the desired longevity.

The bane of the telephone man's life is transmission loss, the causes of which are many and varied. A few of the more common of these may be enumerated as follows: Frayed or inferior insulated drop wire, rusted and corroded splices in both drop and line wires, poorly-formed sleeves, broken and cracked insulators, and poorly-soldered bridle wires.

It is surprising to note how the talking quality of transmission is reduced by some of these seemingly trifling but nevertheless important defects in construction. A thorough appraisal should be made periodically and such construction flaws eliminated from the lines.

Improvement in Drop Wire.

With the advancement of telephony, great strides have been made in the manufacturing field in the improvement of all operating equipment and construction materials. Take, for instance, drop wire—an especially important factor in the continuity of good service to the subscriber. Service, it is said, is only as good as the drop—when the drop fails, service fails.

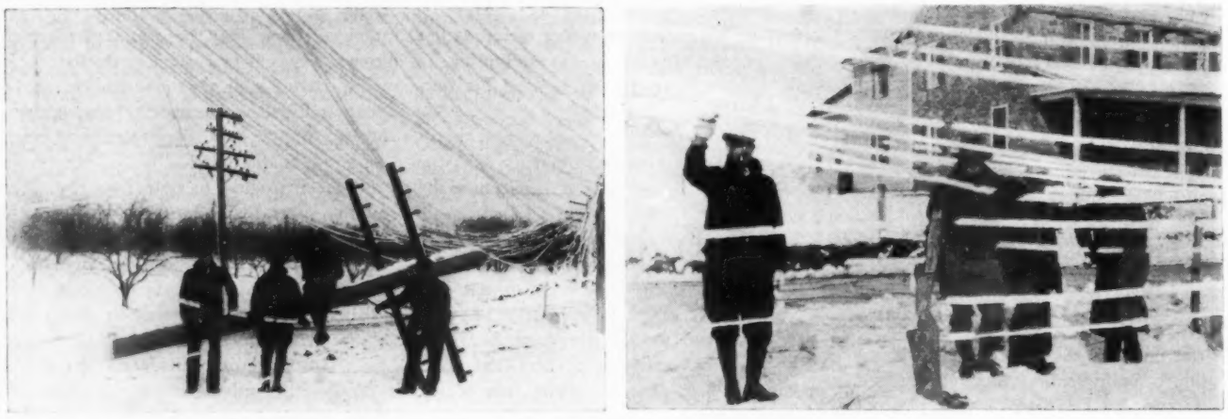
Back in the days when transmission was not considered of great importance, almost any type of drop wire was used, just so long as it would stand up under the stress of sleet and wind. Now that transmission has such a relatively strong bearing on service, it is essential that drop wire embody high tensile strength to withstand sleet and wind, and a conductivity value equal to maximum requirements for good commercial transmission. Consequently, the tendency of many operating men is toward the use of a bronze conductor.

The reasons given for this preference for bronze drop wire are stated as: It has great tensile strength; sufficient conductivity; it is a solid, one metal conductor and will not rust or corrode at cut or scraped ends; it has great flexibility and the linemen find it far easier to work with when installing drops.

One of the leading manufacturing companies announced about four weeks ago an entirely new solid bronze drop wire development that is a decided advance. The new product has 200 pounds tensile strength; it possesses good conductivity, and has a newly-compounded 30 per cent pure rubber content insulation. Tests made by unbiased experts in the laboratories of a prominent mid-western university proved that this drop wire possesses exceptionally long life. Yet with all its many features, it costs actually less than inferior drop wire.

With such a decided improvement in wire, telephone men need have little concern regarding transmission on their drops. Transmission troubles are thus eradicated and the initial or first cost of drop wire is greatly reduced. By choosing the correct drop wire, 50 per cent longer life can be added to your outside plant.

It has been mentioned that considerable transmission loss experienced is accountable for by frayed drop wire braid, causing



Gangs Started Work Early to Repair the Damage on the Lines of the United Telephone Co. of Pennsylvania Near Biblerville—Members of the Hoenstein Line Gang of the United Company Examining Two-Inch Ice on Wires Near Hanover.

the ultimate deterioration of the rubber insulation. This, however, is a condition of the past, one that has been corrected in the better grades of drop wire.

Braids in quality drop wires today are of the best. They are well made from selected material and properly woven over the insulation of the wire. To give the most complete protection, the braid is completely saturated with weatherproofing compounds.

It is common knowledge that the life of drop wire is directly dependent upon the life and quality of its insulation. When the insulation deteriorates, the wire, too, becomes useless.

Improved Iron Wire.

Another striking advancement is notable in the iron line wire of today used in the rural sections where cable construction costs are prohibitive. Formerly iron wire was merely iron wire and was strung on the poles without regard for its ultimate life. This wire has been improved through a double galvanization process formulated and permitted by the Crapo patents.

Exacting tests conducted proved that the galvanized coating of this wire will not crack or peel under the most severe conditions. Again we find transmission assumes a new meaning to telephone men through this vast improvement.

Copper for Long Distance Lines.

For toll or long distance lines and wherever long leads are to be strung, hard-drawn bare copper wire should be used. This wire can now be furnished in No. 12 N. B. S. gauge (.104). This size has recently become very popular in the telephone field.

In building toll lines the very finest type of construction is also essential, and nothing but the best grade of materials should be used, such as A-No. 1 poles, crossarms, glass insulators and insulator pins. With long distance lines so constructed and properly transposed, good transmission is obtained—and maintained.

Even though the initial cost of copper will run somewhat higher, experience has taught us that copper circuits prove far more satisfactory, and more economical when considered from a service and maintenance standpoint.

Cheap Construction.

It is strange, but nevertheless true, that some operating companies buy poles, set them in the ground—and then are careless enough to use two by fours instead of first grade crossarms, porcelain knobs instead of good glass insulators. They merely attach such knobs to the poles by use of spikes rather than employ the glass insulator and a good insulator pin.

This is a deplorable condition as it leads to transmission leakage, especially under damp weather conditions. In addition, "half-way" jobs made with the wrong material never last long. Consequently, they cost more in wasted time and service complaints than the right material would have cost originally. It will be agreed that buying cheap is poor economy.

Tree Trimming.

Tree trimming, on the surface, appears to be only a trifling factor in obtaining best transmission results. Yet lines in contact with the green foliage of trees, especially during the rainy seasons, cause serious complaints, because of the grounding of the lines. There is the resultant loss in transmission which could so easily be eliminated by careful trimming and pruning of trees and other foliage along the right of way.

A good tree trimming tool in the hands of a lineman and a little time spent will aid in improving transmission, and, if done right, it frequently improves the appearance of the tree.

Trees with branches overhanging wires must be trimmed close, to preclude the possibility of the branches sagging down to the wires should they be weighted with snow or whipped about by a violent wind.

Achieving good transmission and maintaining it, ultimately reduces itself to the simple formula of using quality materials, having good workmen and then finally—watching details.

It so frequently is the small detail—the improperly trimmed tree, the glass insulator with a mineral content that has become wet, or the corroded drop wire joint—that causes poor transmission and dissatisfied subscribers. Subscribers are by far too valuable an asset to risk displeasing and losing through the use of second-rate material—materials that may save a few pennies now, but run up many dollars of needless expense before they are replaced.

The entire thought behind this theme has been that first cost is not always the last cost—that economy through the sacrifice of quality should not be considered. Therefore, may it again be emphasized that quality construction materials and good construction work are the first requisites necessary in "Building for Better Transmission"?

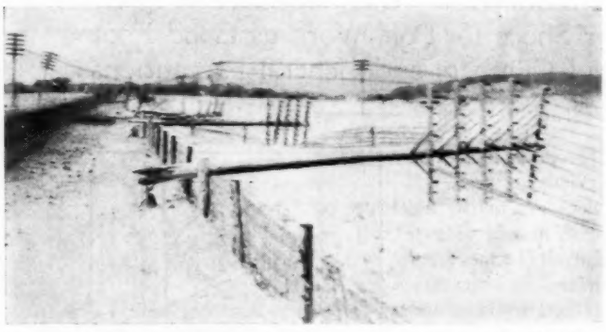
What's Value of Farmer's Telephone? Ask Mr. Johnson.

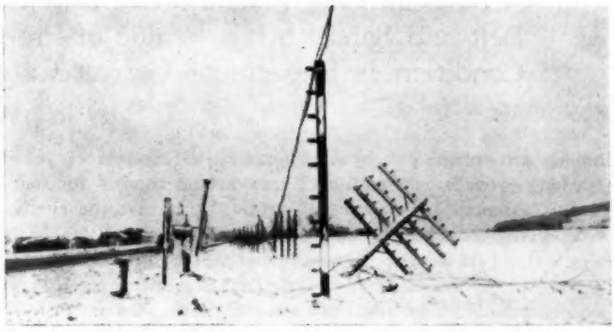
Telephone companies that have been having trouble because of cancellation of farm service are supplied with a powerful argument for retention or reinstallation by a story that appeared the other day in the Nebraska newspapers.

Milford Johnson banked the fire in his furnace and went to bed. A few hours later his wife heard their baby cry, and aroused her husband. Then she fell over unconscious. By the time the father reached the crib, the child had lapsed into coma. He had only strength enough left to life the telephone receiver and call for a doctor before he fell unconscious.

Central called a physician and then, scanning a map of farms in that immediate section having telephones, she called Mr. Johnson's brother-in-law. He had the windows and doors open, after forcing entrance, by the time the doctor arrived and the latter's task of resuscitating the family was easy.

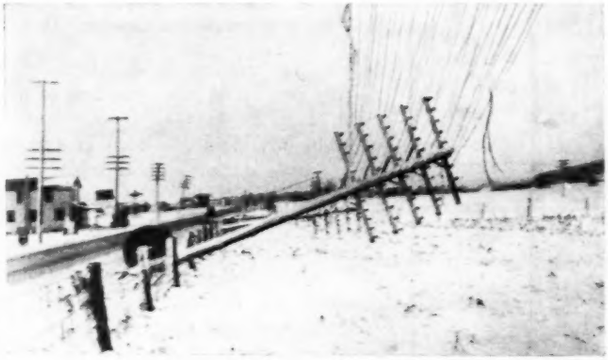
A March Sleet Storm in Pennsylvania



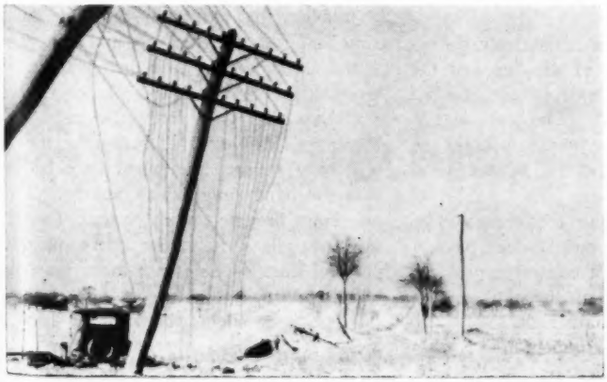


Scenes Along the Highway Between Lancaster and Harrisburg, Pa., on March 6, 1932, Showing the Condition of the Toll Lines of The Bell Telephone Co. of Pennsylvania After the Sleet Storm Which Swept Across the Country, Doing Great Damage to the Telephone Lines in Illinois, Indiana, Ohio and Pennsylvania.

The Lines of the United Telephone Co. of Pennsylvania Near Hanover and Along the Lincoln Highway West of Chambersburg Were in Particularly Bad Shape Following the Early March Sleet Storm.



Telegraph Lines Are No More Immune to Damage Than Telephone Lines. A View of the Postal Telegraph Co. Line Near Lancaster, Pa.—An Interesting Scene West of Harrisburg Showing How a Lead of the Bell Telephone Co. of Pennsylvania Snapped Off Near the Tops of the Poles.



Poles and Much Wire Were Necessary to Repair Conditions Such As This, Near Lititz, on the Bell Toll Line Between Lancaster and Reading—The Western Union Telegraph Co. Lines Along the Harrisburg-Gettysburg Pike Near Shiremanstown.

Climbing; Working on Telephone Poles

Art of Climbing Poles From Beginner's Standpoint—Use and Care of Body Belt and Safety Strap—Value of Proper Shoes for Pole Work as Good Foot Condition Is Important—Correct Care of Climbers and General Precautions

By John A. Bracken

Climbing a telephone pole by a beginner, like learning to walk, is a matter of practice, and is essentially a stepping-up process. Specially-constructed tools called climbers, also known as "hooks" and "spurs," are used for the purpose of climbing wooden telephone poles. They are so designed as to be easily attached to the lower part of linemen's legs.

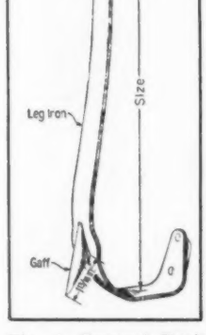
A climber, shown in Fig. 1, consists of a strip of flat steel about 1¼ inches wide bent into the shape of an "L", and varying in half-inch sizes from 14½ to 18 inches in length. A steel prong called a gaff or spur, projects downward about 1¾ inches from the corner of the bend. Two leather straps, one to place around the leg above the calf, and the other around the ankle, hold the climbers in place.

When starting to climb for the first time, there is but one rule for the beginner to follow. That is: "Keep the hips, shoulders, and knees well away from the pole."

If the knees are allowed to approach the pole too closely, the climber gaff will break out of the wood, and a fall may result. For this reason the student should confine his practice to the first six or seven feet of the pole near the ground, until satisfied that he can climb higher with safety.

Inasmuch as tenseness tends to destroy coordination, the student pole climber should learn absolute relaxation of nerves and muscles when attempting to climb. Relaxation seems to coordinate mind and muscle and makes climbing more easy to accomplish.

In practicing, the beginner should learn to place the weight of the body on the climbers confidently, just as in raising his foot and placing it on a stair step. He should take care to see that the selected pair of climbers properly fit the feet and legs so that no discomfort results from standing on the climber for long periods of time.



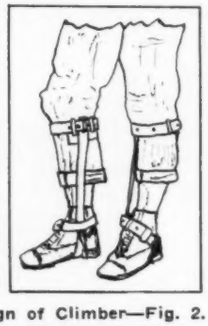


Fig. 1. General Design of Climber—Fig. 2. Method of Fastening Climbers to Legs.

In case the climber does not fit the leg properly, it can be bent by means of two wrenches. Climbers generally come from the manufacturers with the leg iron unbent. They must, therefore, be bent and twisted to the curve of the leg of the individual wearer. For this reason, a pair of climbers cannot be expected to fit every one who puts them on, any more than a pair of shoes.

Some professional linemen prefer to wear a right and a left climber, just the same as a right and left shoe. The only difference between this type of climber and the plain ones is that the gaff of the climber slopes slightly forward. The gaff in the plain type of climber points straight to the side and can, therefore, be worn on either foot.

Fig. 3. Correct Position for Taking First Step Up Pole.

In order to determine the correct size of climber to wear, the student should measure the distance from the projecting knee bone to the arch of the shoe on his foot and subtract one-half inch.

When attaching the climbers to his legs preparatory to begin climbing for the first time, the student should take particular care before fastening the leg straps, to pull the trousers up to the shoe tops. This leaves the trousers loose at the knees, thereby permitting more freedom of movement, Fig. 2. Just as a baby learns to walk by first taking a step or two at a time, so the student climber must learn to climb telephone poles, a step at a time.

Fig. 4. In Climbing Pole Keep Shoulders, Hips and Knees Away from the Pole and Use Short Steps When Learning to Climb.

Upon starting to climb it is well for the student to begin with short steps—about nine inches long—applying only minimum pressure in forcing the climber gaff (pointed steel spur) into the pole. Ordinarily the weight of the body is sufficient for this purpose, except on poles of very hard wood. The position for taking the first step is shown in Fig. 3.

Jabbing the gaff into the pole at any time is a wasted effort and makes the withdrawing more difficult. Besides this, the student may lose his balance trying to withdraw the gaff from the pole. Furthermore, jabbing the gaff into the pole will only splinter the wood very badly so that the hands might pick up the splinters or gloves become unduly worn. By treading the pole closely, the gaffs make two parallel lines of holes not more than three inches apart.

The knees should be kept at least six inches from the pole at all times, thus directing the gaff towards the heart of the pole and insuring against skidding. An effort should be made to keep one leg straight and stiff.

The gaff must be pulled from the pole before taking the next step, but it should not be removed from the pole until the other has been fixed in place. While taking the short steps, as illustrated in Fig. 4,

Fig. 5. Method of Passing Safety Strap Around the Pole.

an effort should be made to carry all the weight of the body on the feet and not on the hands. The hands should only assist in balancing the weight of the body on the climbers. After the short steps are mastered, the longer steps can be taken.

Descending the pole is the reverse of the climbing process; it is a process of stepping down. The student should not attempt to lift the gaff upward from the pole to release it; the gaff should simply be broken out by allowing the upper knee to swing out in an arc away from the pole. The stirrup of the climber serves as a pivot in breaking the gaff from the pole.

In climbing a leaning or crooked pole, the student should climb in such manner as to keep on top of or above the lean or bend of the pole.

Body Belt and Safety Strap

After the student has become proficient enough in climbing to feel at ease on the telephone pole, he should put on the body belt and safety strap. The belt and safety strap are very important items of the climbing equipment, for it makes all the difference between life and death to the man hanging on the side of a pole whether or not his support is secure. However, if he has a good body belt and safety strap he is able to forget about it while working; in fact, he "thinks nothing of it."

After buckling the body belt comfortably around his waist, the student should then fasten both snap hooks attached to each end of the safety strap to one *D* ring of the body belt. He is now prepared to climb the pole to the desired location and use the safety strap.

This latter is done by holding the pole with one hand—left or right of the side on which the strap is hanging, as the case may be—while unfastening one of the safety snap hooks from the *D* ring of the other. Then passing the end of the safety strap around the pole, he grasps it with the fingers of the hand holding the pole, as shown in Fig. 5, releases the hold on the strap held in the other hand and uses this hand to hold on to the pole while snapping the hook of the safety into the opposite *D* ring of the body belt.

Particular care should be taken to see that the snaps of the safety strap are actually hooked in the *D* rings of the belt and that the keepers of the snaps are fully closed. A click heard when fastening the snap hooks does not necessarily mean that the hook is safely in place.

Before letting go of the pole both of the snap hooks should be examined thoroughly, thus making sure of the fastening in the *D* rings. This may be accomplished by letting the weight of the body gradually upon the safety strap, keeping both hands on the pole until certain that the strap is safe as shown in Fig. 6.

In working on the pole, the first thing for the student to do is to take a position so that the feet and the body will not be strained unduly. To do this, set the climber gaffs so that one foot is placed slightly above the other, stiffen both legs and let the weight of the body be supported by the safety strap and lower foot.

The upper foot and leg are used principally to balance the body and in slight shifting about the pole. Thus the working position can be easily changed without placing the hands upon the pole or taking them off the work.

To remove the safety strap, the student should grasp the pole with one hand and, after removing the weight of the body from the safety strap by drawing slightly towards the pole, unfasten the snap hook from one of the *D* rings and pass it around the pole until it can be grasped by the fingers of the hand holding the pole. Then, still holding the pole with one hand, fasten the snap hook on the loose end of the strap to the *D* ring.

Inasmuch as the body belt and safety strap are such very important parts of a lineman's pole-climbing equipment, and for the reason that he places his life on them many times in a day's work, the belt and strap should be given the closest attention and care.

One abuse of body belts and safety straps that causes accidents is the drying of wet belts and straps over hot pipes, radiators, stoves, etc. True, they dry more quickly in this manner, but here is what is liable to happen to them:

The fibers which make up a large part of the belt and strap leather are composed of protein compounds, the most abundant of which is collagen. This material constitutes the bulk of the substance of the fibers below the grain surface, and upon heating with water, the collagen goes into solution as gelatine. This separation of gelatine from the fiber results in their destruction and causes the leather to become hard and brittle when dried. Belts and straps in this condition are dangerous and unsafe for use.

Body belts and safety straps should be given frequent inspections and tests to insure that they are in good condition. The leather should be treated occasionally with neatsfoot oil to keep it pliable. Watch carefully for the condition of: Leather; leather near buckle holes; rivets; stitches; buckles; *D* rings; and snap hooks. Belts and straps which are found to be weak or defective in any respect should not be used.

Where repairs are necessary, they should be made immediately. Belts which have been repaired should be reinspected after the repairs have been completed. In case the repairs have not been made in a satisfactory manner, the belt or the strap, as the case may be, should be withheld from use until the necessary repairs have been made properly, or until a new belt or strap has been provided.

Only first-class material should be used in making repairs. No more holes than are absolutely necessary should be cut or punched into a body belt. Holes weaken the leather.

The attachment of metal parts to body belts should be avoided insofar as possible. Metal chains and keepers or copper wire hooks should not be used for purposes of carrying tape or tools. In their place there should be used leather or rawhide strings with hard wood or fiber keepers. The *D* rings should be placed so that they will

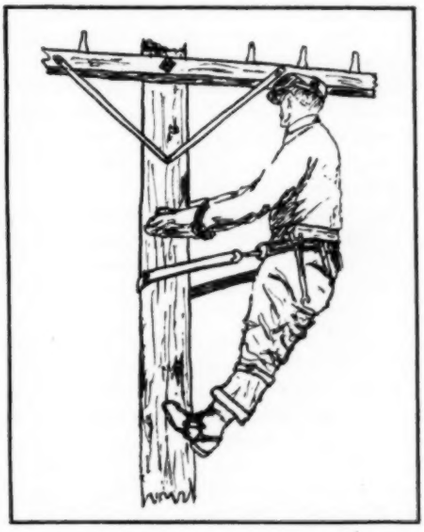


Fig. 6. Allowing the Body to Be Supported by the Safety Strap.

be supported from the inside of the body belt. A lineman will then be less liable to fall in case a *D* ring pulls out.

A lineman's body belt and safety strap should be used for no other purpose than that for which they are intended. In going

to and from jobs, belts and straps should be stored in a satisfactory way in proper compartments on the truck to protect them and to prevent them from being cut by tools and from being caught under heavy line material.

The Feet.

In performing telephone line work the student lineman's feet are the foundation on which he builds his efficiency. If his feet are not in proper condition, his capacity to perform the required work feels the limitation.

The human foot is composed of 26 small bones, many of which are tiny and delicate, and held together by ligaments and muscles. Ligaments are strong, elastic tissues connecting the extremities of movable bones. The weight of the entire body structure is carried by two distinct and separate arches, the longitude and the transverse.

The normal ligaments and muscles so hold these arches that spring and resiliency is given to the foot and body with each step; in other words, the arches act as a shock absorber. But as soon as these ligaments weaken through strain caused by overweight or constant pounding on hard surfaces in incorrect footwear, the arches elongate, causing the bones of the feet to assume abnormal positions, resulting in deformities.

Telephone linemen usually spend the greater portion of their working day on their feet; and what is more distracting and detrimental to a good day's work than aching feet?

Painful feet not only irritate the sufferer, but one actually tires easily; they cut the power of production in half. It is reasonably certain that a man who is afflicted with painful feet cannot give the best that there is in him, because of suffering, and his mind is on his feet instead of his work.

The feet of the lineman play too important a part in the consideration of frequently climbing and working on telephone poles to pass by unobserved, because the entire weight of the body depends upon the feet, and especially upon the arches for its sole support, and the maintenance of correct balance.

When the arches, which act as a foundation, weaken and sag, the entire anatomical structure not only loses its grace and poise but collapses, causing the body to trip easily. This lack of springy arches even causes the bones to fracture when falling. Athletes, realizing that the feet must have some means of artificial support to uphold the weight of their body, tape their feet during training to avoid accidents in which their limbs are endangered.

In the elimination of this danger, correct footwear is the safest preventive method known, because of the fact that the shoes are built to hold the arches of the feet in their natural three-point, weight-bearing position.

When climbing and working on telephone poles, the beginner should bear in mind that the human foot acts the same as a foundation does to a building. A good structure must have a perfect foundation. One cannot expect the feet to do a lot of useful work without giving them some consideration. Therefore, for comfort in climbing and working on poles it is advatageous to wear a pair of heavy-soled shoes or heavy-soled laced hi-cuts.

When standing on a pole in climbers, the entire body is supported by a surface of about one inch wide, and the width of the shoe in length. This narrow strip is directly under the instep of the foot where the foot is not supposed to carry much weight. Therefore, a heavy-soled shoe will help to distribute the weight of the body over the entire surface of the foot. Unless this precaution is taken, injury to the foot may result.

In telephone centers where experience from foot injuries and foot troubles bulk large, much attention is being given to the protection of employe's feet by the introduction of safety type shoes.

When we think of the self-inflicted torture that is thoughtlessly heaped on protesting feet, there should not be anything formidable about the term "safety" and "safe wear" shoes that is not borne out in fact. A safety type shoe is certainly better than the possible results from dropping an iron manhole cover across toes not properly protected.

Safety shoes, as might be supposed, are not cumbersome, for they would largely defeat their primary purpose of increasing a man's efficiency if they were. Neither are they, nor are shoes that are safe to wear, expensive.

If a man's feet are out of condition, his capacity for work feels the limitation. If his feet are injured, he is liable to be put out of the running; and if the injury is serious or encounters complications, the consequences may be more than the price of enough safe-to-wear shoes to last a lifetime.

In view of all this, whenever the student lineman notices that he is not as fast as he would like to be, due consideration should be given to his feet. A bruised toe, a stinging blister, or a fallen arch may be the basis of some of his troubles. Or it may be that the full-breasted bunion or callous that is rasping against a wrinkled shoe lining, is sapping his otherwise most willing efforts.

Therefore, when the student lineman discovers foot afflictions, immediate steps should be taken to correct that evil by visiting a chiropodist, or an orthopedic shoe specialist who accurately measures the foot and fits it with a shoe that is made to help the foot to comfort and health. These preventive methods bid fair to cut the loss of man-power in this industrial age, an age when everything must be produced at a minimum cost.

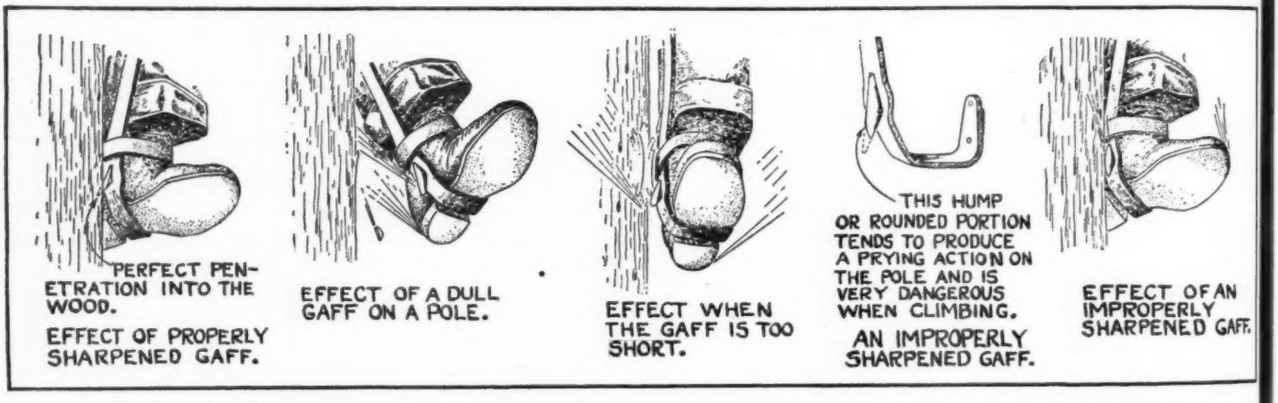

PERFECT PENETRATION INTO THE WOOD.
EFFECT OF PROPERLY SHARPENED GAFF.
EFFECT OF A DULL GAFF ON A POLE.
EFFECT WHEN THE GAFF IS TOO SHORT.
THIS HUMP OR ROUNDED PORTION TENDS TO PRODUCE A PRYING ACTION ON THE POLE AND IS VERY DANGEROUS WHEN CLIMBING.
AN IMPROPERLY SHARPENED GAFF.
EFFECT OF AN IMPROPERLY SHARPENED GAFF.

Fig. 7. Effect of Properly Sharpened Gaff, and the Possible Results When a Dull, Short or Improperly Sharpened Gaff Is Used.

General Precautions.

From a standpoint of safety the following are some general precautions for the student lineman relative to climbing and working on telephone poles:

(1). Climbers should be regularly inspected for loose gaff, dull gaff, improperly-shaped gaff, fractured gaff, or the start of a fracture; difference between lengths of gaffs of a pair greater than ⅛ inch; length of individual gaff less than 1⅛ inch.

(2). The climber pads and straps should be thoroughly examined to determine the condition of all parts, and that the appearance of pads and straps indicate neither deterioration nor injury sufficient to affect the strength of the straps or the wearing comfort of the pads. If the condition of any pad or strap is found to be such that there is doubt as to its safety when in use

it should be replaced before using the climber again.

(3). When climbers are not in use for long periods of time, the leather straps and pads should be oiled at least once every six months. First, clean the leather with a good grade of saddle soap dressing before oiling, because oil applied to dry or dirty leather has a very harmful effect. After the lather formed by the soap has been well worked into the leather, place the pads and straps in a shady place to dry. When nearly dry, rub them vigorously with a soft, clean cloth.

While the leather is still slightly damp, use on each pair of straps and pads, about one teaspoonful of neatsfoot oil. Apply the oil gradually to the leather with the hands and rub in well. A light, even distribution of the oil is most effective. Do not use mineral oil or greases, such as vaseline or machine oil, for this purpose. After oiling, place the pads and straps in a shady, dry place for a day in order to let the leather dry slowly.

After drying, rub the leather with a soft, clean cloth to remove all remaining oil. This is very important because leather with too much oil on it will stretch and is likely to collect sand and grit which will injure it. Climber straps should never be substituted by the use of rope, wire, etc., as such substitutes are dangerous.

(4). Climbers should not be worn when traveling to and from jobs, but should be removed when working on the ground.

(5). Climbers should be used only on telephone poles. It is unsafe to use them on trees, fences, etc., and they are also liable to cause damage to private property.

(6). Owing to buildings, fences, etc., very often being built close to the field side of telephone poles, the student should climb all poles on the road side if possible, thus avoiding striking these obstructions while either ascending or descending the pole.

(7). The shoes should not be allowed to come in contact with the pole when climbing.

(8). Avoid interlocking the hands behind the pole while climbing.

(9). Cut-outs cause falls; therefore, care should be taken to put climber gaffs only in sound wood and to avoid all knots, loose wood, checks, cracks, decayed spots, nails, ground wire and other attachments on poles.

(10). When it is necessary to climb ice or sleet-covered poles, special care should be taken to set the gaffs in the pole securely so as to prevent their cutting out; also if possible, the pole should be climbed with the gaffs seated in the slippery side of the pole in order that the hands may engage the drier side and reduce the chance of falling.

(11). The safety strap should always have both ends fastened to one *D* ring while climbing. This will prevent it from becoming entangled with the legs.

(12). If a coat is being worn, the body belt should always be placed on the outside in order that the *D* rings can be easily seen and reached.

(13). Safety belts should not be supported from line insulators, line wires, or from pins and crossarms which may be weak or decayed. The belt should not be attached to a pole above the top crossarm, nor to vertical braces, crossarm braces, or to pole steps. Neither should the safety belt be placed around crossarms and similar equipment being removed, in the process of dismantling, or to anything from which it might slip off.

(14). When the safety belt is being put in place on a pole, particular care should be taken to see that it is not twisted and that it does not become fouled and give way when strain is applied by the body. After shifting to another position on the pole, care should be taken to see that the safety belt snap hooks are properly fastened in the *D* rings before any work is undertaken.

While this test is being made, it is well to have the hands close to the pole or other support so that the support may be grasped if necessary. This test should be made every time the safety belt is used in a new position. Safety belts should be so secured that there will be no possibility that the snap hooks will cut out by being accidentally pressed against the pole or other line equipment.

(15). When steps are provided on poles, they should always be used for climbing instead of the climbers. It is very important that the climbers are properly taken care of, especially the gaffs which should always be kept sharp, Fig. 7.

There are four principal items in sharpening the climber gaff: That the gaff is long enough to warrant its further use; not to change the temperature of the steel while sharpening; that under side of gaff is kept straight; top side of gaff must be kept tapered and not allowed to curve.

In sharpening the climber, Fig. 8, place it in a vise with the gaff extending at an angle of about 45 degrees above the vise jaws. A fine file should be used and the face so filed as to keep a straight line down the top side and a straight face on the under side. Do not file the outside facing as this tends to change the shape of the gaff, and it is apt to cut out of the pole when being used.

File the gaff slowly (so as not to heat the steel and remove the temper) to a rounded bayonet point. Avoid filing to a needle point as it is very unsafe. Gaffs should never be sharpened on an emery wheel or a grindstone because the heat will remove the temper from the gaffs and make them unsafe to climb with. Gaffs should not be allowed to become shorter than 1¼ inches measured underneath.

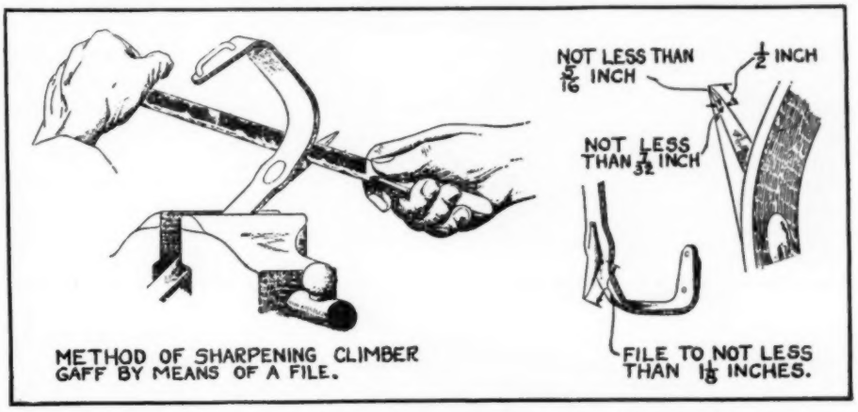

NOT LESS THAN 5/16 INCH
1/2 INCH
NOT LESS THAN 7/32 INCH
METHOD OF SHARPENING CLIMBER GAFF BY MEANS OF A FILE.
FILE TO NOT LESS THAN 1⅛ INCHES.

Fig. 8. Method of Sharpening Climber Gaff and the Proper Measurements Which It Should Have. It Should be Filed According to the Dimensions Given.

When gaffs are so worn that they break out, they should be replaced with new ones.

Finally, the student should remember that it is always dangerous to stand at the foot of a pole while a fellow worker is climbing up. It is also very dangerous for him to climb a pole while another is climbing above him because the man climbing above may slip, he may dislodge splinters and chips, or may drop tools or material. Therefore, before attempting to climb a telephone pole behind another, the student should always wait until the other man has reached the working point on the pole and has settled himself.

A careful plant man endeavors to form a good habit—that of thinking first. The man who fails to be careful and think clearly before he acts perhaps does not realize others might be injured by reason of his failure to think.

The best safety device is a careful man. Therefore, the man who has made a habit of thinking and planning how to work safely, of being alert to the job at hand, is a safe worker and has safety in his own hands.

The application of safe practices relative to climbing and working on telephone poles cannot be given too much attention.

Prices in the Metal Markets.

New York, April 4: Copper—Quiet; electrolytic spot and future, 6c. Tin—Easy; spot and nearby, $19.62; future, $19.87. Lead—Steady; spot New York, 3c; East St. Louis. 2.90c.

Small Dial Exchange Building Design

Essential Features of Small Telephone Buildings Which Are to House Unattended Dial Equipment Explained—Efficiency and Satisfaction May Be Obtained by Proper Attention to Floor Layout and the Construction Details

By P. A. Bolander,
Technical Publications' Staff, Automatic Electric Co., Chicago, Ill.

The proper housing of small, unattended Strowger dial systems does not necessarily involve elaborate or expensive facilities. All that is actually required is that reasonable precautions be established to insure the equipment against damage by the elements, and that the equipment be suitably located and arranged for proper supervision and maintenance. Beyond these relatively simple basic requirements, there naturally is no limit to the extent to which local conditions or needs may be satisfied.

Each small Strowger dial system consists of an automatic switchboard comprising one or more unit sections housed under a dust-proof cover, a main distributing frame, a storage battery, and a power board.

With respect to the shape of the room space, this equipment, because of the "sectional type" of construction employed, can be readily installed in rented quarters in an office building, store, or even in a residence.

In this article, the requirements for small central-office buildings to shelter Strowger dial systems are briefly described. Recommendations with respect to construction, size, ventilation, etc., are included as a guide to telephone companies planning to erect such a structure.

General fireproof or semi-fireproof construction is recommended. Wall-bearing construction of brick, poured cement, cement block and hollow building tile have been extensively used for these small telephone exchange buildings.

In the western part of the United States, stucco on metal lath, using either wood or metal studding, is often preferred. Metal studding is, of course, desirable for fireproofing.

The type of foundation is dependent upon the size and kind of building to be erected, the topography of the lot, nature of the soil, drainage, and whether the floor slab is to be elevated above or laid on grade. For these small buildings, basements are not generally required.

In any event, a firm foundation, preferably of cement, should be employed in order to minimize settling of the building.

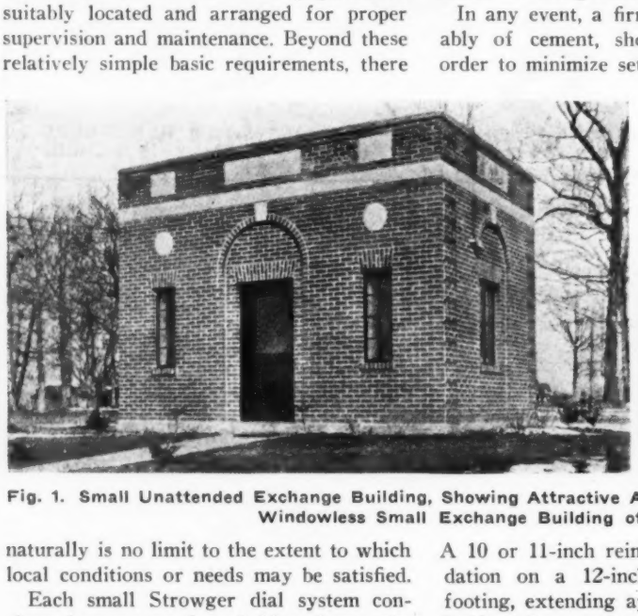


Fig. 1. Small Unattended Exchange Building, Showing Attractive Architectural Treatment Possible Even with Small Building—Fig. 2. Windowless Small Exchange Building of Simple and Economical Construction.

A 10 or 11-inch reinforced concrete foundation on a 12-inch by 8-inch concrete footing, extending approximately 2 feet 6 inches below grade, provides very satisfactory construction for brick or similar type of buildings.

Where the lot is high and comparatively free from moisture, or can be graded or otherwise quickly drained, the cement floor slab may be laid upon the ground. To provide a damp-proof floor of this kind, the following construction is recommended:

After the plot has been properly graded, 18 inches of tamped cinders are placed upon the ground, then a rough reinforced concrete slab three or four inches thick, followed by a heavy layer of asphalt. On top of this, a one-inch finished concrete floor is laid, which should be treated with a waterproof compound. The building shown in Fig. 1 employs a floor of this construction.

In case the lot is generally low, and adequate drainage cannot be economically obtained, it is recommended that an elevated reinforced concrete floor be used. In this case, an air space of not less than 1 foot 9 inches should be provided between the floor and grade lines.

A means of ventilation should be included in the foundation walls so that this under-floor space will be generally dry. Galvanized iron grills, backed with galvanized wire-mesh bird screen, are suitable for these vents.

The three major factors in the design of the walls for these small buildings are: Fireproofing, damp-proofing and economical heating in extremely cold climates.

Brick, cement, stone, or stucco on metal lath and metal studding are adequate fireproofing materials. Such construction, however, may not always produce a moisture-proof building or permit economical heating unless proper consideration is given to the design of the walls, roof and ceiling.

To assure the walls being free from moisture, an air space should be provided between the inner and outer walls. Cement block and building tile provide a dead air space without further consideration.

The building shown in Fig. 1, which, because of its peculiar location, was especially designed to be entirely free of moisture, employed eight-inch brick veneer walls with a two-inch air space, then studding, lath and plaster. The two-inch air space was carried into an 18-inch attic space, with a ventilator placed in the ceiling of the room.

One-half inch iron pipes were installed in the brick walls at the floor line, one at each corner of the building. These pipes protruded through the brick walls into the two-inch air space, in order to give outside air circulation between the walls. This method of establishing air space and circulation can, likewise, be applied to poured-cement or stucco-on-lath type of walls.

As previously mentioned, an operating ventilator was placed in the ceiling, in order to increase air circulation within the switchroom when desired.

When reinforced concrete roof slabs are

employed, air space should be provided between the slab and the ceiling; or a cinder fill and a fireproof roof should be installed above the roof slab. The former method will generally prove the more economical and satisfactory.

Some of the foregoing requirements were influenced by local conditions and in many localities would be unnecessary.

While not essential to the operation of the switching equipment, for damp-proofing reasons and for cleanliness, it is generally desirable to provide plaster or other suitable interior walls. There are a number of insulating materials on the market which are suitable substitutes for plaster walls.

When it is necessary to do painting within the switchroom after the switchboard is installed, the use of turpentine in paints or varnishes should be avoided.

Concrete floors may be covered with battleship linoleum or be coated with "granolithic" or other good cement paint.

The size of the building is dependent upon the amount of switching and associated equipment to be housed. Aside from the initial equipment to be installed, consideration should be given to the ultimate requirements of the building based on the anticipated growth for the 15- or 20-year period.

For buildings of the size under consideration, it will generally prove more economical to provide the ultimate building at the beginning than to plan an addition for some future time.

In general, a more economical floor plan layout can be realized if the building is of rectangular shape. Assuming that the switching equipment consists of a single type 51 switchboard unit, the switchroom should be not less than 10 feet wide and 12 feet long inside, and should have a clear ceiling height of 10 feet.

A 100-line switching unit and associated equipment can, of course, be installed in considerably less space, but such reduction would encroach upon the space allowed for aisles. Crowding of equipment, thus narrowing aisle space, should be avoided as better workmanship will be realized if ample aisle space is allowed. Space is also desirable for storage of materials, workbench, heating equipment, etc.

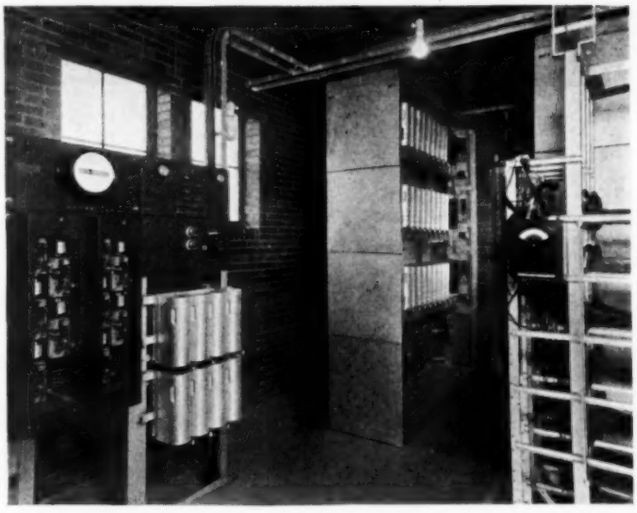


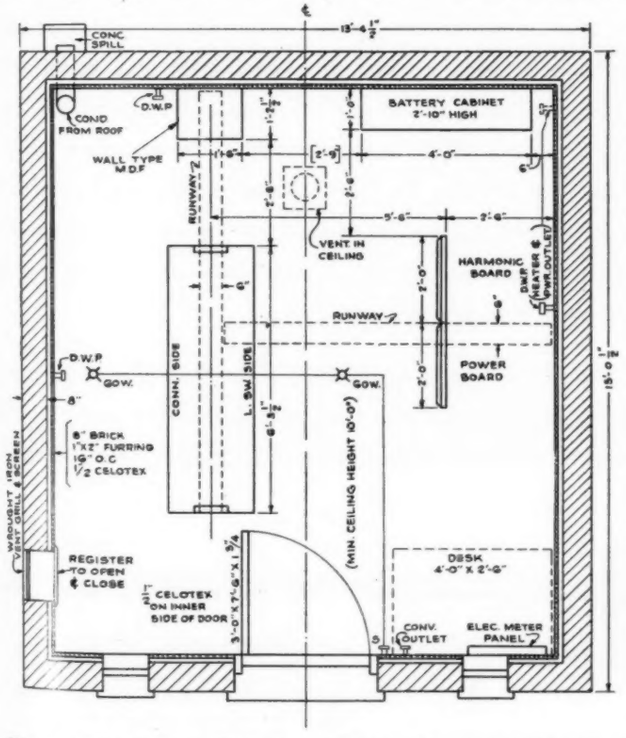
Fig. 5. Interior View of a Typical Small Strowger Automatic Unattended Exchange.

When a separate power board is provided, slightly more floor space is required than when a power shelf mounted within the switchboard is used.

Before the size of the building is definitely determined, an equipment layout should be prepared. Space does not permit inclusion of layouts for all the equipment sizes and possibilities of floor plan arrangement, but two typical floor plans are given which it is felt will meet the requirements in the majority of cases.

In Fig. 3 is shown an equipment layout for a building of the type in Fig. 2. This plan also shows considerable architectural detail of the building. Assuming a switchboard unit comprising four sections, which is the maximum height that can be installed in a room having a clear ceiling height of 10 feet, this layout will accommodate 200 lines of switching equipment.

It will be observed from the diagram that a separate power panel and a harmonic ringing panel are employed. When harmonic ringing party-line service is not given, all the necessary power equipment



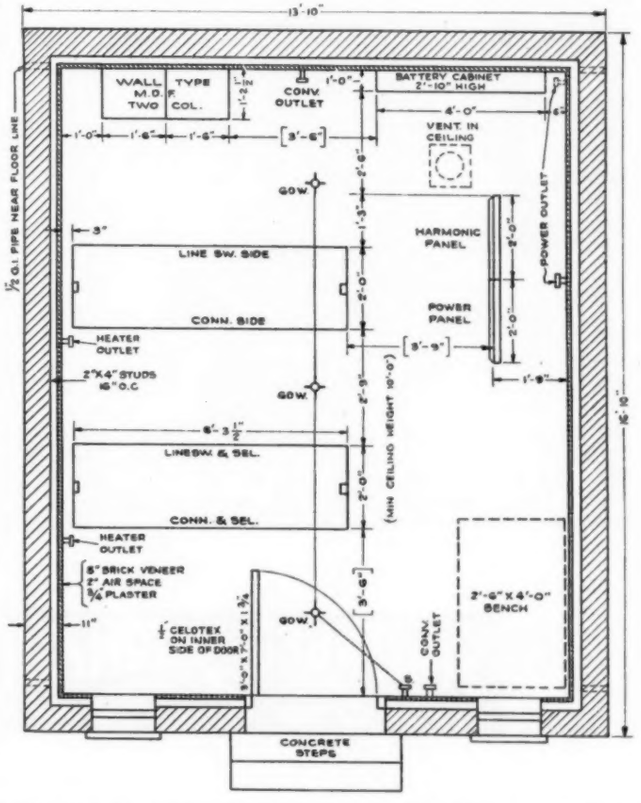


Fig. 3. Typical Floor Plan for a 200-Line Strowger Automatic Unattended Exchange—Fig. 4. Typical Floor Plan for a 300-Line Strowger Automatic Unattended Exchange.

Modern Materials + Proper[esig]
= Successful Product

The four styles shown above, as well as the Monophone shown in the larger illustration, all utilize Bakelite in their construction.

IN designing the Monophone, the Strowger Staff sea[rched the world] to find materials with which to form the modern tele[phone they had] in mind. Plastics, metals, insulating substances of e[very kind were] tested with the result that the perfected Monophone [is the product] of none but the finest materials—the best modern scienc[e can offer.]

A typical example of this care of selection is evide[nced in Bakelite,] the material used for the handset, cradle and base of t[he Monophone.] This material has a deep, beautiful lustre which lasts th[e life of the in-] strument. It is light in weight, yet unbelievably tough a[nd yet it is] highly dielectric, and moulds easily into the attractive, [graceful shapes] for which the Monophone is noted.

All components have been ingeniously coordinated [by the ex-] perienced Strowger Staff into an instrument combining co[mfort with] high efficiency, beauty with unmatched performance. Th[e perfected de-] sign of transmitter and receiver units, coupled with spec[ially tuned] circuit, promotes conversational clarity and results in su[perior trans-] mission. Perfect balance of handset, a silent and trouble-pr[oof, rugged] construction and great durability—all contribute to th[e unexcel-] lence of this product.

One need look no farther than the sales record of the [Monophone for] proof of its universal success. Send for samples TODA[Y and for] yourself the definite points of Monophone superiority.

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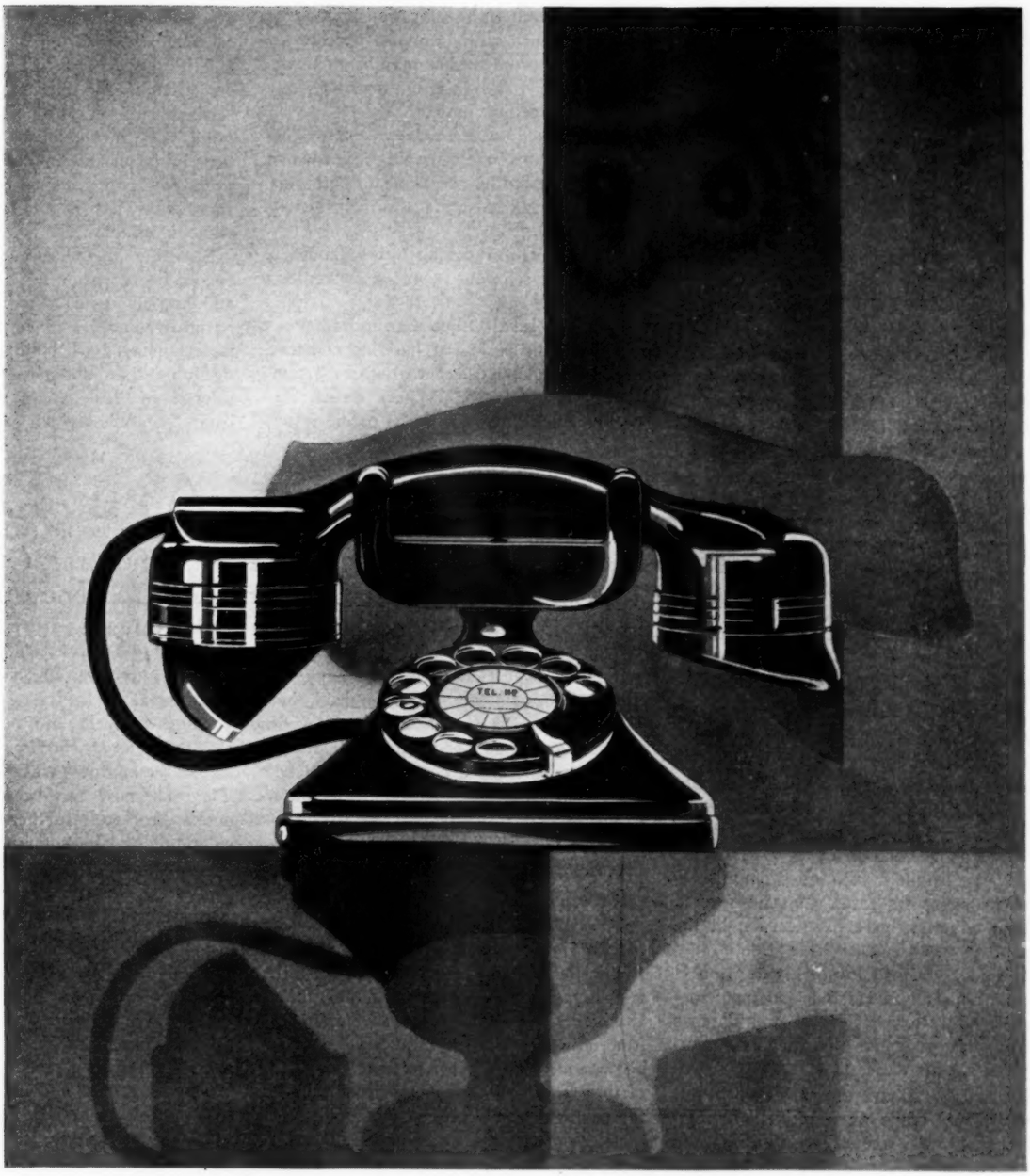

The Monophone pictured above is available in black and colors.

matic Electric Company

Manufacturers of Strowger Automatic Dial Telephone and Signaling Systems

CHICAGO, U. S. A.

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is located within the switchboard, thus permitting the inside width of the room to be reduced to 10 feet without undue crowding of the equipment.

Increasing the inside length of the building 6 feet 3½ inches permits two units of sectional equipment, butted end to end, to be installed, which provides a layout for an ultimate of 300 lines.

Fig. 4 shows a floor plan layout which will likewise accommodate an ultimate of 300 lines. This layout is compact, requiring a floor area of only 15 feet by 12 feet, yet ample aisle space is provided.

Fig. 5 is an interior view of a typical small unattended exchange building. While the equipment arrangement differs somewhat from the typical layouts given, a good conception of the interior appearance of the building can be obtained from this illustration. The sectional-type switchboard unit, four sections high, is shown with the metal panels removed from the cabinet.

This view also shows a floor-type main distributing frame, whereas a wall-type main distributing frame is more generally used in these small unattended exchanges. The floor of this building is of concrete, the ceiling of insulating material, and the walls of glazed brick which requires no additional finish and can be readily kept clean by washing.

Switchroom Lighting.

In the small, unattended central-office building, special lighting arrangements are not required. General illumination is usually secured from ceiling-hung lamps. These lighting units may be simple drop lights equipped with a suitable reflector, or a more elaborate fixture may be employed. Figs. 3 and 4 show the approximate location of the ceiling outlets.

Convenience outlets for extension lights, soldering irons, etc., should be provided, located so as to be accessible to both sides of the switchboard units, the main distributing frame.

The outlets for ceiling lights should be on a circuit separate from the convenience outlets.

Central-Office Ground.

During the period of building construction, an adequate central-office ground should be provided. Where direct connection can be made with the public water-supply system, usually this source of ground contact will suffice.

In case connection to such a water system is not available, one or two 'made grounds" should be installed. Patented ground cones or cylinders are suitable for such purpose.

The ground lead from the water pipe or ground electrode to the main distributing frame protector ground bus, and also to the "+" battery terminal, should not be smaller than No. 6 B. & S. gauge.

The suggestions and specifications referred to in the foregoing have been described with the ideal set of conditions in mind, and it should be understood that they by no means represent definite limitations and requirements. In general, they represent what is desirable rather than what is essential.

Strowger unattended exchanges are in successful operation in all sorts of climates and housed in all sorts of structures, but naturally, under a given set of conditions, a certain type of building may be more desirable than another. The suggestions offered in this article may serve as a basis for studying individual requirements.

What the Commissions Are Doing

Up-to-the-Minute News Regarding the Activities of State and Interstate Commissions, Courts and City Councils in Matters Concerning Telephone Companies—Summary of Commission Orders and Schedule of Telephone Hearings

Decision Reserved in Motion to Dismiss Michigan Bell Case.

William S. Sayres, Jr., standing United States master in chancery in Detroit, Mich., stated on March 25 at the conclusion of arguments on a motion to dismiss the proceedings by which the Michigan Bell Telephone Co. seeks to restrain the Michigan Public Utilities Commission from lowering its rates, that he wanted time in which to give his decision in the case.

He said he wished to put his decision in writing, and invited Harold Goodman, special assistant attorney-general, and Thomas G. Long, attorney for the telephone company, to submit data.

The motion to have the case thrown out of court was made on March 19 by Mr. Goodman. His motion to dismiss was based on two decisions of the United States Supreme Court, one handed down about a month ago and the other in December, 1930.

The first of these was the case of Smith against the Illinois Bell Telephone Co. It holds that the American Telephone & Telegraph Co. license contract cannot be used as a basis for making rates and that the license contract must be revealed to the court in a rate hearing.

The second case was that of the Western Distributing Co. against the Kansas Public Service Commission. The U. S. Supreme Court, Mr. Goodman said, held that the district court was justified in dismissing the gas company's bill for its failure to reveal the cost of gas which it purchased from a corporation, which controlled it.

Property Transfer Authority Deferred by Alabama Commission.

The Alabama Public Utilities Co. on March 17 was authorized by the Alabama Public Service Commission to purchase the telephone properties of the South States Utilities Co., serving several north Alabama towns. The approval was given in accordance with a previous order last September in which the commission required the payment by the purchasing company of certain outstanding accounts.

The commission also granted the purchasing company authority to issue 10,000 shares of common capital stock of a par value of $5 a share, but declined to approve proposed execution of a five-year note for $35,000 until other conditions specified by the commission have been fulfilled.

In an order issued March 30, the commission rescinded its order of March 17, authorizing the sale because checks sent to the commission by the South States Utilities Co. in payment of delinquent fees for inspection were returned unpaid by the different banks upon which they were drawn.

Approval of the sale had been withheld pending payment of the fees and upon receipt of the checks, the commission stated, the approval was given on March 17. The case now has been restored to the docket "for such further hearing and consideration as the commission may find to be just, necessary and reasonable."

Donations to Charity Not Chargeable to Operating Expenses.

The New York Telephone Co. on March 30 was directed by the New York Public Service Commission to eliminate all its gifts to charity from operating expenses and charge them against corporate surplus.

The order, adopted unanimously, relates to all gifts in the last three years as well as all future charges. The company, in the last three years, was alleged to have charged charitable gifts totaling $233,413 to its operating expenses.

The commission stated the order was the result of an investigation it launched after reports that the company "had made donations to various organizations and committees and had included such donations in the cost of telephone service."

"The amount available for dividends is not affected by whether the charges are included in operating expenses or deducted

(*Please turn to page* 48.)

Fundamentals in Central Office Layout

Conservation of Floor Space and Ideal Operating Conditions May Both Be Attained With a Little Preliminary Study—Flexible Equipment Arrangement May Be Made to Fit Requirements of Local and Toll Plant; Some Suggestions

By H. T. McCaig,
Assistant Chicago Manager, Stromberg-Carlson Telephone Mfg. Co.

Many who are confronted with the job of making up a layout of central office equipment, grapple with such a situation for the first time. To such the outlook presents a number of problems, all of which apparently require related attention—much like a jig-saw puzzle. And that is about the way the subject has to be treated, for each unit should take its place in a harmonious related whole.

Sometimes there is an insistent demand that floor space be conserved. This is not so true in the case of the small office, but occasionally, even in such offices, this item intrudes itself. Again, the quarters into which the plant is being moved may not lend themselves well to the floor space requirements of some of the apparatus items. This constitutes a real problem and can only be met by careful, patient maneuvering.

It is well to attempt to keep in mind just as much as possible the desirability of placing apparatus according to standard practice, and the planning of all units in harmony with such practice. If departures from the orthodox path have to be made, strive to have them reduced to the minimum. This is not so difficult if a new building is being erected, but is not always easy if leased quarters are to be occupied.

Occasionally even leased quarters are found to lend themselves almost ideally to the requirements of good central office engineering. Fig. 1 is an example of this approach to the ideal. Here the room layout, without any alteration whatever, lends itself admirably to the requirements of this small common battery exchange. In the study of this layout we find the following points which commend it to one who would correlate the apparatus and the activities of his exchange in an efficient manner:

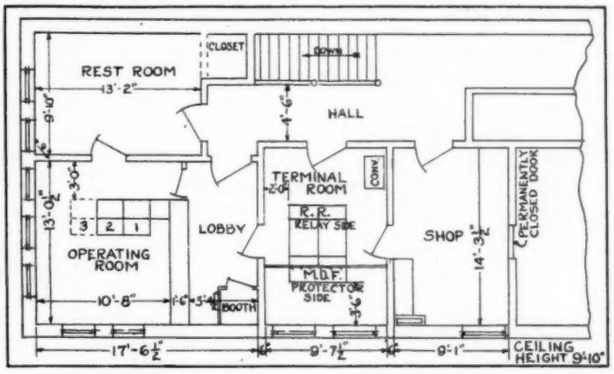

Fig. 1. Floor Plan of a Small Office in Leased Quarters. Note the Near-Ideal Arrangement of All Rooms and Equipment.

The public has access to public space without going through vestibules, hallways or equipment rooms. Chairs, settees and booth are readily available.

Operators can leave or enter the rest-room without passing through the switchboard room. They can also pass directly to or from the switchboard room.

The maintenance man can enter either terminal room or shop directly from the corridor without going through the other one of these two rooms, or without entering the switchboard room or public space. He can pass from shop to terminal room, or from terminal room to public space and operating room, without having to go through a hallway.

The arrangement of all apparatus units is in harmony with good plant design since cable and wire runs are relatively short and the relative positions of main frame and relay rack with respect to power apparatus and associated units sets up a symmetrical layout.

The exchange cable entrance, while not shown in Fig. 1, is in this instance made through a room on the lower floor of the building (this telephone exchange is located on the second floor of a two-story business block) and the approach to the main distributing frame is, therefore, very sightly. Ample room is provided in the room designated as "shop" for instrument repairs and the storage of maintenance stock required for immediate needs.

The ceiling height is such as to afford good ventilation and good lighting while also contributing very nicely to the use of overhead cable racks of appropriate height. A ceiling height less than this will not be nearly so satisfactory.

Such a layout is well balanced and, as self-evident from close study, it affords ample room for all anticipated growth. When the plant served by this layout expands to the ultimate possibilities of this arrangement of central office equipment, it probably will have attained proportions sufficient to warrant the construction and occupation of its own building.

Fig. 2 illustrates a layout again almost ideal in its arrangement for the size of plant to be served. In this instance the equipment is housed in a building erected exclusively for telephone company occupancy. It is a one-story building of pleasing exterior appearance. In addition to the first floor occupied by the central office equipment and business office as shown in Fig. 2, there is a full basement and a

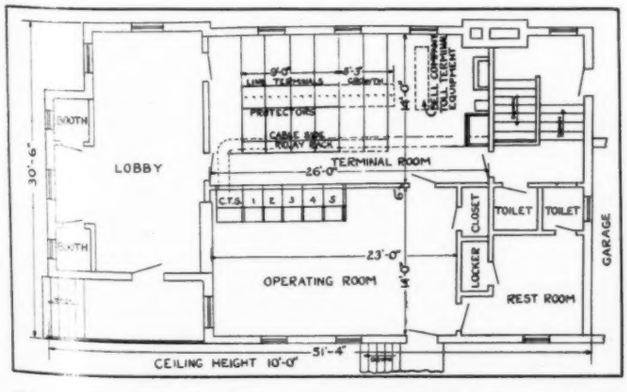

Fig. 2. Floor Plan of 700-Line Exchange Installed in a Company-Owned Building—Fig. 3. View of the Company-Owned Building Housing the Equipment Shown on Floor Plan.

garage. An exterior view of the building is seen in Fig. 3. Floor space has been conserved to a remarkable degree in this layout, and yet operating requirements have been given due consideration.

Setting the switchboard sections in line with one of the interior walls contributes materially to this economical use of floor area. Two other items also add their contribution:

There is a large opening between the operating room and the lobby occupied by a counter across which customers place their long distance calls and pay their bills. The cashier's desk is located in the operating room where both the chief operator and the cashier can utilize their time in handling the clerical work of the exchange.

The manager's desk is in the open in the lobby where he is easily accessible to any subscriber of this exchange. This arrangement has been found to contribute remarkably to the satisfactory public relations enjoyed by this company.

The operating room in this exchange has been acoustically treated. Operating conditions are found to be improved vastly through the installation of the proper materials designed for this purpose.

To make for an ideal layout, certain of the building dimensions and room outlines should be more or less flexible until the apparatus has been spotted so that window and door openings in exterior walls and the location of all interior walls and openings therein might be shifted to provide the most nearly ideal conditions.

Such a concession to the apparatus and its space requirements will be found to be a very profitable investment since it opens the possibility for the most economical use of floor space and, in the largest possible way, contributes to the avoidance of waste space.

Quite often—and especially is this true in the erection of a new building to be occupied by the telephone company—the lot upon which the building is to be erected or some other factor, or factors, seem to establish the approximate dimensions of the building. Granted that these dimensions are at all reasonable and that there seems, therefore, to be the need of designing a layout which will be accommodated by a building of the prescribed size and general characteristics, one may begin to lay out his equipment by tentatively establishing interior wall lines at certain approximate locations, later to be shifted as the space requirements of the apparatus seem to make advisable.

Before a decision has been reached to erect a building to house the new equipment, very probably a fair idea of the size of the switchboard has already been determined. The number of positions will undoubtedly be known as well as the number of lines to be installed. Through having decided the number of positions to be installed and the number of lines to be served by the new board, one has practically determined the size of line relay rack (in the case of the common battery exchange) and of the main distributing frame.

Now the next step is to determine the actual dimensions of these items of central office equipment and to make cut-outs of them to scale, using their overall dimensions. The cut-outs should be made to the same scale as that used in drawing up the tentative floor plan which is now under discussion.

One can generally be certain of the advisability of keeping the switchboard, relay rack, and main distributing frame in close proximity to one another and preferably on the basis of locating these items in standard relationship to one another, such as depicted in Fig. 2.

By following such a layout it is seen that the cabling from the protector side of the main distributing frame to the cable side of the relay rack, and from relay rack to the switchboard, is carried over a short, direct routing. Other arrangements of these units may have to be adopted to meet local conditions, but they do not yield the maximum economy of cabling nor the desired symmetry of layout.

With apparatus cut-outs in hand and before one the tentative floor plan of the building to be occupied, one can shift these cut-outs about until he gets the layout that seems to meet all anticipated requirements, or at least one that in the largest measures goes in that direction.

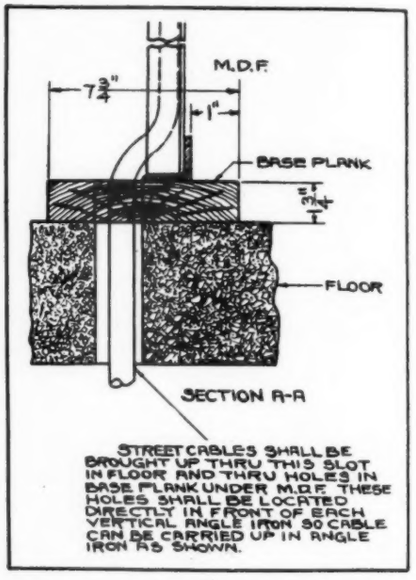
M.D.F.
7¾"
1"
BASE PLANK
FLOOR
SECTION A-A
STREET CABLES SHALL BE BROUGHT UP THRU THIS SLOT IN FLOOR AND THRU HOLES IN BASE PLANK UNDER M.D.F. THESE HOLES SHALL BE LOCATED DIRECTLY IN FRONT OF EACH VERTICAL ANGLE IRON SO CABLE CAN BE CARRIED UP IN ANGLE IRON AS SHOWN.

Fig. 5. The Wide Base Plank Under Foot of Main Frame Conceals Cable Openings Through the Floor and Contributes to Cleanliness and Neatness About Base of Frame.

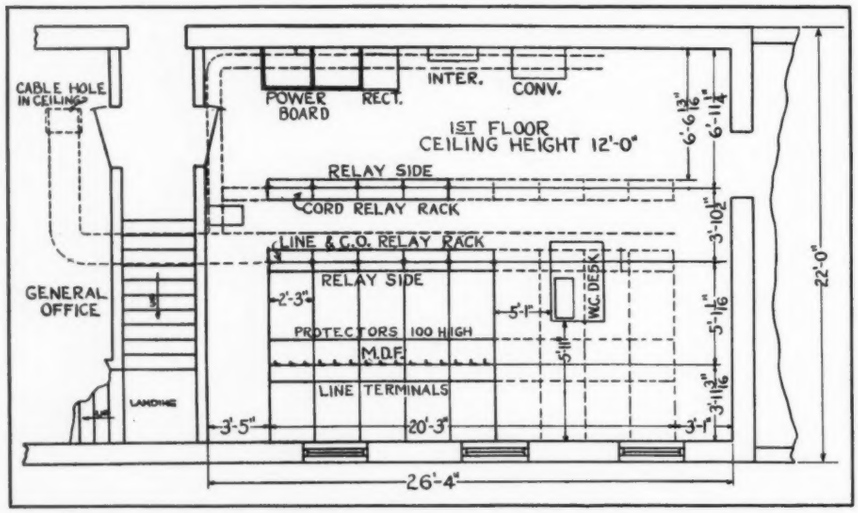

Fig. 4. Arrangement of Terminal Room Equipment in a Typical Thousand-Line Exchange. Room for Expansion Is Provided While Frames Are Designed to Grow in Step with Each Other.

In the laying out of larger exchanges these same problems have to be met and solved; the difference is largely only one of working with larger apparatus units and the necessity for blocking out the space for anticipated growth. This is more apt to take place with a degree of certainty in the large exchange than it is in the small or medium-sized exchange.

Fig. 4 illustrates a floor plan layout of an exchange slightly largely than that shown in Fig. 2. In this case the building, owned and occupied by the telephone company, is a two-story and full basement with the operating room and restroom on the second floor, business offices and terminal room on the first floor, stockroom, heating plant and battery room in the basement, with garage to the rear.

It will be observed that the terminal room apparatus has been given about the same treatment as that seen in Fig. 2 where the main distributing frame and relay racks are designed to grow in step with each other, thus providing a highly desirable measure of efficiency in maintenance without impairing the conservation of floor space.

Until one is faced with the laying out of a rather large office, there is little or

no advantage to be gained in arranging equipment on relay rack or main distributing frame so as to make it necessary to use a ladder to get to the upper units or to prostrate one's self on the floor in order to get at the lower units. Floor space costs in the small and medium sized exchanges—and for that matter in some of the larger exchanges—do not mount so rapidly as to make it at all economical to save a little on this item and to spend a great deal in time and inconvenience through having to maintain equipment located at inaccessible levels.

In addition to the inconvenience of getting at main frame protectors or relay equipment mounted in the extreme high and low levels, there is an element of danger involved which can not be discounted. Ladders which must be used in getting at the line cable terminals, protectors or relays are bound to be in the way a considerable portion of the time. With the main distributing frame built to high levels, there is always the temptation to use the lower horizontal levels as rungs of a ladder.

A well-designed central office of small or medium size will, therefore, quite generally have its main distributing frame laid out on a 100-per-vertical grouping of protectors and a six-level, horizontal terminal block distribution for exchange cables. Associated with such a frame the relay racks should be laid out on a 300-line-per-bay basis.

There is more than the desire to evolve a symmetrical layout that prompts one in thus laying out the relay racks and main distributing frame. It is the fact that the switchboard growth in positional development will just about keep step with line growth in the standard 300-line groups.

Thus, in a layout like that shown in Fig. 2, by the time another 300 lines are added to the main distributing frame and relay rack equipment, another operator's position probably will be required since the traffic by that time will have increased to a point where additional operator facilities will be required at the peak hour. Beyond this point it is reasonable to expect that the addition of yet another group of 300 lines, or a major portion thereof, will call for another operator's position.

While we are on the subject of placing equipment and the layout of terminal room frames, it is well to give a thought as to how we are going to bring our exchange cables in to the main distributing frame and distribute them on the exchange cable terminals.

In the instances falling under the writer's observation the method shown in Fig. 5 has been found to be most satisfactory for bringing the frame tip cables up through the floor. By providing the 8-inch wide base plank upon which the angle iron foot of the main distributing frame shall rest, it is possible to sweep and clean about the frame without contributing to an accumulation of dirt and rubbish around the cable risers. This plan is found to be much preferable to that formerly followed, of having the riser cables come up alongside the base plank.

By using 200-pair leaded silk-and-cotton riser cables, or frame tips as they are sometimes called, a scheme can be worked out whereby any number of cables of 200-pairs each can be terminated on the standard six-level horizontal side of the main distributing frame.

In designing a layout of main distributing frame and line relay rack equipment for a medium size common battery plant it is well to assign the first vertical of relay rack to toll, rural and miscellaneous use, mounting thereon toll line relays, rural line relays, recording trunk equipment and miscellaneous office trunk or inter-position trunk equipment. Successive bays of line relay rack should mount the common battery line relay equipment.

Opposite the first bay of relay rack the first three verticals of the main distributing frame should be assigned, respectively, to miscellaneous terminals, toll line protectors and rural line protectors. On the first vertical the miscellaneous terminals will include wire chief's test trunks, chief operator and information trunks, recording trunks, inter-position and miscellaneous circuits, etc.

In nearly every instance where an exchange reaches the size of that shown in Fig. 2 the connecting toll company will have toll terminal equipment installed, included in which there will undoubtedly be toll test jacks.

The toll company will, very probably, bring in a toll entrance cable which it will wish to terminate on protectors to be furnished by it on a vertical of the main distributing frame, for which arrangements will be made to compensate the local telephone company.

The local telephone company may in turn have short toll lines of its own, which it will wish to carry through toll test jacks, either in its own wire chief's desk or in the toll line company's test panels, through the courtesy of the latter. It is well, therefore, to provide two sets of terminal blocks on the miscellaneous vertical of the main distributing frame so that tie cables from the toll test jacks can be terminated on one of these sets of terminal blocks, while the cabling to the toll line relays shall be terminated on the other set of terminal blocks.

By means of jumper connections between these two sets of terminal blocks a most flexible arrangement is afforded whereby any toll-line face equipment and associated relay apparatus can be assigned to any given toll line belonging to the toll company or to the local telephone company. Without such provision for cross-connecting, a rigid predetermined association of relay and face equipment must be set up for the respective groups of toll lines.

If any of the local telephone company's toll lines or rural lines are to be phantomed, arrangements should be made for installing standard phantom type repeating coils in appropriate portions of the line relay rack not occupied by the line relay equipment. Fig. 6 illustrates the possibilities of such a layout. This arrange-

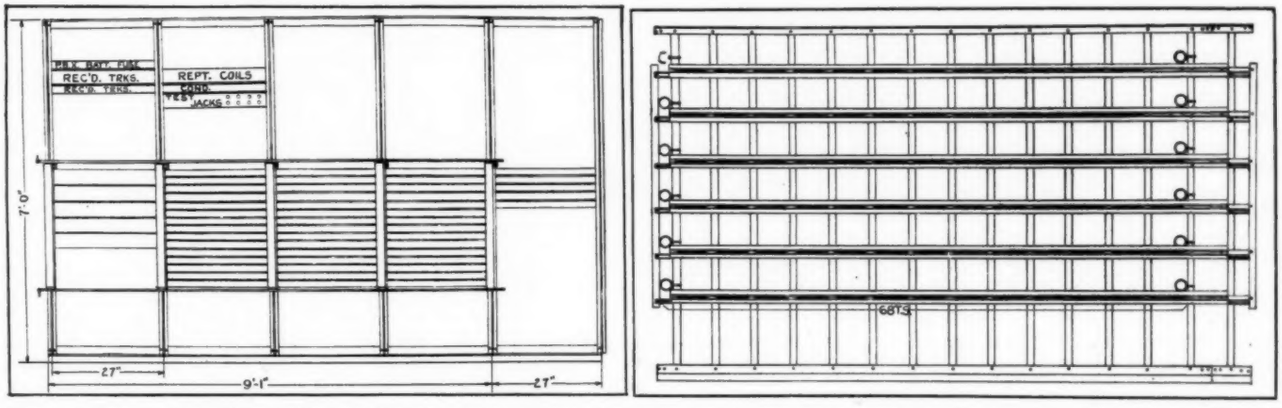

Fig. 6. Phantom Repeating Coils and Test Jacks Mounted in Unassigned Relay Space in Line Relay Rack and Cabled to Special Terminal Block on Main Frame Provide Convenient Means for Phantoming Any Cross-Connected Line Circuit—Fig. 7. Horizontal, or Exchange Cable, Side of a Main Distributing Frame Laid Out on the Six-Level Plan. Note Accessibility of All Cable Terminals and Ease of Jumper Tracing.

ment of repeating coils and test jacks associated with the local company's toll and rural lines is a part of the line relay rack equipment in the exchange, the floor plan arrangement of which is shown in Fig. 4.

By cabling these repeating coils and test jacks to a set of terminal blocks on the miscellaneous vertical of the main distributing frame, facilities are afforded for cross-connecting any toll line or rural line to a repeating coil and associated test jacks. This makes for a very flexible arrangement and is highly recommended where the local company is interested in developing the maximum use of its circuit facilities.

No exchange layout program is complete until definite assignments of space have been made for the power apparatus, although the actual locating of this apparatus and the relative positions to be occupied by the several units may, under certain conditions, be postponed until the actual work of installation is under way. Too much latitude in this respect ought not to be encouraged, but the power layouts should be left sufficiently flexible to make possible certain shifts of the apparatus without interfering seriously with the general power plant development.

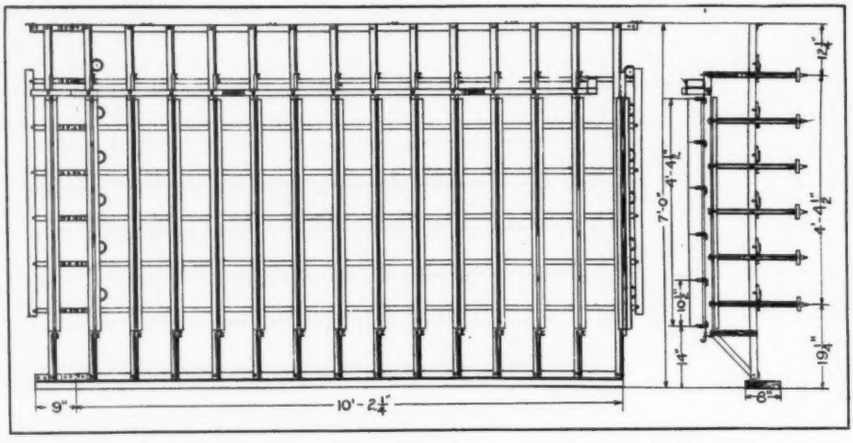

Fig. 8. Protector Side of a Main Frame Laid Out on the 100-Per-Vertical Plan. All Protectors Are at Convenient Heights. End Elevation Shows Wide Base Plank.

Where harmonic converter units are mounted on steel frames thereby giving a substantial structure to their assembly, it is often found satisfactory to mount any associated equipment—such as rotary interrupters for machine ringing—right on the iron framework of the converter. Such an arrangement makes the power wiring to combined interrupter and converter assembly a much simpler job than otherwise would be required.

In designing the power circuits and the functions of the apparatus involved there should be borne in mind the very efficient service now being rendered by practically all commercial power circuits. In most cases the service is very dependable with little, if any, interruption.

Such dependability makes it entirely feasible to plan storage battery equipment on the basis of providing total capacity of not more than six to eight busy-hour requirements. In some instances this figure can be reduced.

By providing charging equipment which will carry the switchboard load and the storage batteries on a float basis, we can operate our telephone plant right off the power line much the same as though it were a motor or any other current consuming device.

If a break in power supply is of such major consequence that service will not be restored within the period in which load requirements will satisfactorily be met by the storage batteries of the exchange it is only necessary to assemble a number of automobile type batteries providing the proper voltage for the operation of the exchange circuits, since such relief equipment will carry the plant on over another period of from 80 to 100 ampere hours.

Nearly all the plants of this size we have been discussing in this article have enough rural subscribers immediately tributary to the exchange to make the handling of their traffic one which should be given careful consideration in laying out a switchboard and specifying the circuits.

The shift of traffic from hour to hour on a board of this size is such that all operators should be trained to handle all types of connections.

It would seem, therefore, to be the utmost folly to provide one or more positions of such a board with speedy "feature" cord circuits, the sole use for which will be the answering of local common battery lines and the connecting of them to other common battery lines or trunk circuits. This situation is made more intolerable if an operator whose position is thus equipped should have a call from a common battery subscriber for a rural magneto subscriber.

She would have no means of effecting the connection herself and would very probably be equipped with a trunk circuit terminating in a jack at her position, wired to a jack at some other position of the switchboard designated as a rural, or universal cord, position. Here a connection between the trunk circuit and the rural line would be effected.

Through hookswitch supervision is not provided over such a trunk circuit, so if the local common battery subscriber should want to regain the rural, or universal, operator's attention in order to get another connection, or to secure a re-ring on the called rural line, he could not signal through the local position's cord circuit and the trunk circuit to the universal position operator but would on the contrary signal the local position operator. She, in turn, would have to move her plug in and out of the trunk jack in order to signal the rural operator.

In this sort of a setup not only is the supervision of a type that begets a lot of dissatisfaction and criticism but, moreover, it ties up during the period of the local-to-rural conversation a very expensive feature type cord circuit in the local position.

A trunk circuit can be installed in the local position which will give through supervision to the universal operator and which will release the expensive feature type cord circuit for use in other connections. However, any trunking arrangement calls for delaying operations on the part of the feature position operator, which are not offset by the increased efficiency noted on other types of connections.

For the exchange up to 900 or 1,000 lines it is believed that universal cord circuits throughout make a better layout and provide better traffic facilities. Such cord circuits permit the operator to answer any kind of incoming call and to complete connections to any type of line. Double supervision is afforded in all instances. So far as operating conditions are concerned, all subscribers get the most nearly uniform answering time and connection completion conditions.

If machine ringing is used in a plant of this type, the machine ringing is applied on all connections to common battery lines. The cord circuit automatically adapts itself to all connections with magneto lines over which machine ringing cannot be projected.

To ring over such lines, circuit conditions are set up for manual code ringing. By installing individual five-party ringing keys in all universal cord circuits, provisions are set up for handling selective party line service on the local common battery lines; and through the use of reverse jacks on the rural lines provisions are made for furnishing 10-party selective common battery service on these rural lines.

The designing of central office layouts is very fascinating work. Especially is this true when one is given a new building layout. If, fortunately, the building characteristics are such as to lend themselves to a highly satisfactory layout, the men who have contributed to the finally-adopted layout get quite a thrill out of seeing the installation develop to a point where service is actually being given over the new equipment.

WHAT safety factor does a pole need near the end of its life?

If pole line costs are to be controlled accurately, a knowledge of ultimate fibre stresses in wood poles—both when they are new and throughout their service—is essential. The comparatively constant strength of AmCreCo poles during their entire life makes possible the use of a small factor of safety with a consequent reduction in pole size or span lengths. Ask for a copy of the American Standards Association's specifications for southern pine poles, dimensions of southern creosoted pine poles, and ultimate fibre stresses of wood poles.

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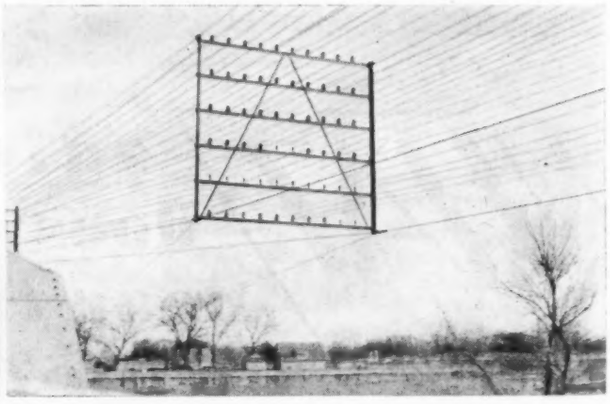
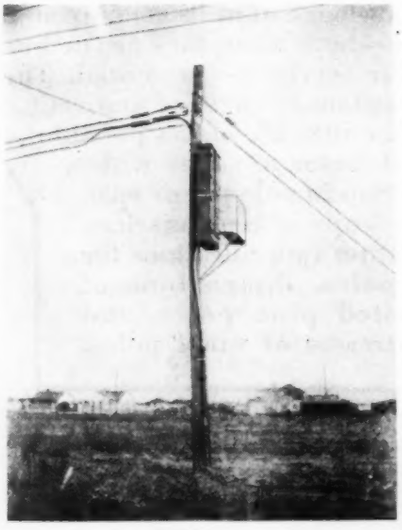
The Unusual in Telephone Construction

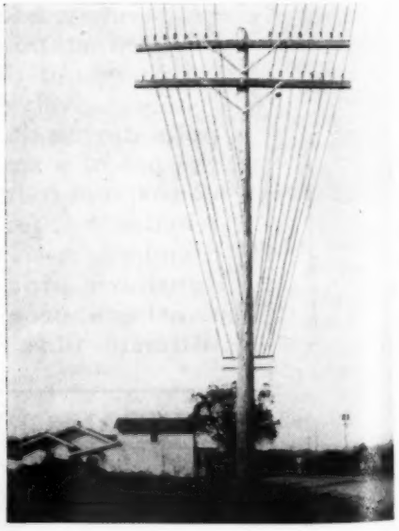
In Telephone Plant Work the Practical Construction Man Observes Many Novel and Interesting Things—Some of These Out-of-the-Ordinary Methods or Unusual Bits of Outside Construction Are Pictured on This Page

In the State of Nuevo Leon, Mexico, This Ox Team Was Pulling Cart with Wire Reel for Cia Telephonica del. Norte, S. A. The Oxen Were Used Because They Could Get Through the Brush Better Than Horses—Paul D. Myers, Indiana Stromberg-Carlson Representative, Sent in This Photograph Showing a Log Cabin Telephone Exchange Near Belmont, Ind., in the Hills of Southern Indiana. This Is Believed to be the Only Log Cabin Telephone Exchange Building in the Country. The Telephone Company Is Owned and Operated by Wm. Exner, Who Clearly Marked Its Home with the Words "Telephone Exchange" Over the Door.



Rural Lines in the Southwest on Poles with Natural Crossarms—Center Crossarms of a Novel River Crossing.





Just An Old Telephone Pole Derelict—End of the Aerial Cable—An Unusual Lead with 16-Pin Crossarms.

PHILCO

Progressive Engineering

PHILCO exhibited the illustrated assembly of the Steel-Glass Telephone Battery for tank battery replacement at the United States Independent Telephone Convention, Stevens Hotel, Chicago, Oct. 20-21-22-23, 1931.

SEMI-SIDE VIEW
4160 A. H. PHILCO Steel-Glass Battery for Tank Replacement.

END VIEW
PHILCO Paralleled Steel-Glass Assembly.
4160 A. H. Capacity (8-Hr. Rate).

MODERN
COMPACT
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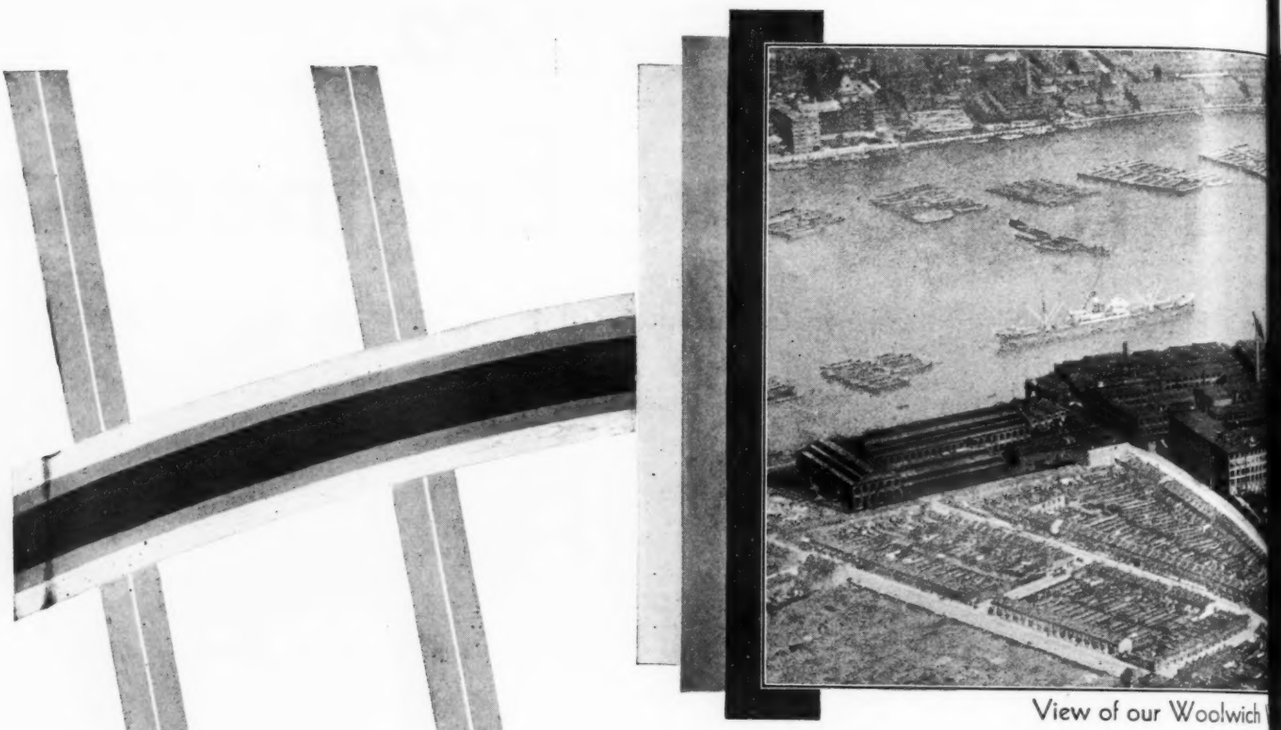
LOW IN COST
SPRAY PROOF

This PHILCO Development comes into its own because of Telephone Demand for Economy and Reduced Maintenance in large capacity battery operation. Flexibility in capacity—ease of installation and perfect mechanical and electrical construction are features of this assembly.

PHILCO
DIAMOND GRID
BATTERIES

PHILADELPHIA STORAGE BATTERY COMPANY
ONTARIO and C STREETS, PHILADELPHIA, PA.



View of our Woolwich

Yesterday's R
are To-da

EVER since Sir William Siemens, F.R.S. (then William Siemens), established his small London fa in 1843, experience has been accumulating whi expressed to-day in the unrivalled resources of Sie Brothers & Co., Ltd.

As each fresh avenue of electrical and industrial rese has opened up, the scientists and engineers of Sie have been in the vanguard of the advance.

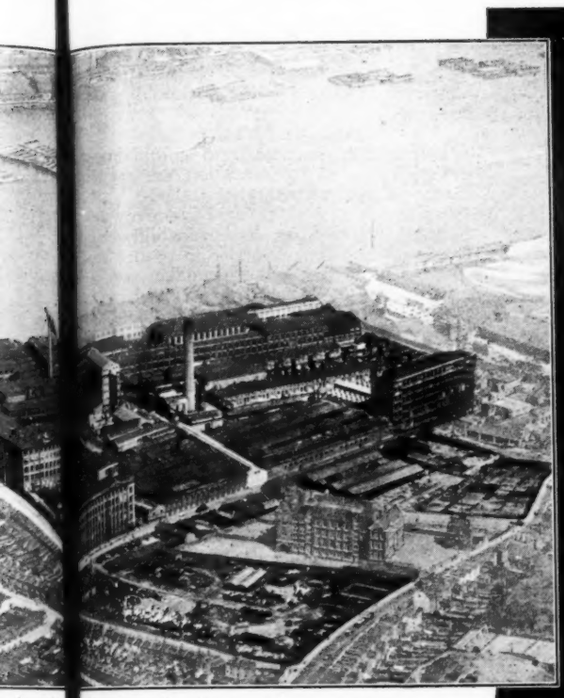
As evidence of the Company's world-wide activities the manufacture and laying of submarine telegraph telephone cables, it may be mentioned that well over such cables have been made by the Company, and very nearly half of the cables which at present span

SIE

SIEMENS BROTHERS & C

REPRES

Winnipeg, Rio de Janeiro, Buenos beth, Durban, Melbourne, Sydney, Wellington, Auckland, Tokyo, Shan Madras, Colombo, Ipoh (Perak F. M.



oolwich Thames in background.

RARCHES
daRESOURCES

. (then Atlantic were manufactured at the Company's ondon fac wich works and laid by its Cable Ship "Faraday."

ting whic s Brothers have also taken a most prominent part in s of Sie entific investigation and practical solution of telephone ems. Siemens telephone instruments and automatic ges are famous the world over.

strial rese Neophone — Siemens' most recent development in s of Sie one research—is already recognised as "The World's activitie efficient Telephone." Standardized by the British Post elegraph and the Union of South Africa and adopted by many well over important overseas telephone administrations, it has any, and it, like other modern Siemens products, nearly ninety sent span electrical experience.

The NEOPHONE

sets a new high standard of transmission efficiency and articulation.

EMENS

& CO. WOOLWICH, ENGLAND

REPRESENTATIVES ABROAD:

iro, Buenos Aires, Cape Town, Johannesburg, Port Elizabeth, ne, Sydney, Adelaide, Newcastle (N.S.W.), Perth, Tokyo, Shanghai, Malden, Harbin, Calcutta, Bombay, (Perak F.M.S.), Manila, Singapore, Penang, The Hague.

When communicating with Siemens Bros. & Co., Ltd., please mention TELEPHONY.

WHAT THE COURTS AND COMMISSIONS ARE DOING.

(*Concluded from page* 38.)

from surplus," said the opinion, written by Chairman Maltbie. "The essential difference is that when they are placed in operating expenses, they become part of the cost of the service, which is to be borne by the telephone subscribers.

"In all rate cases, operating expenses are the basic element, and the New York Telephone Co. in its proceedings before the commission and the courts has uniformly submitted, as proof of confiscation or justification of its rates, its operating expenses without eliminations or deductions for donations."

Regarding the claim of the company that the donations were small when compared with the operating expenses, the commission said:

"It is just as necessary that an item of $100,000 be correctly entered upon the books of the New York Telephone Co., as it is that an item of $10,000,000 should be so charged. In determining taxable income, the New York Telephone Co. may not treat donations as operating expenses, even though they may be so carried in their accounts."

At a recent hearing the company contended that the Interstate Commerce Commission had jurisdiction over all accounting matters and that the state commission lacked authority to charge donations against operating expenses. In reply to this contention, Chairman Maltbie said:

"It is quite apparent that the purpose of the New York Telephone Co. is to escape from state regulation, although 85 per cent of its business is intrastate and only 15 per cent interstate."

The opinion ended:

"Throughout the testimony and discussions that have taken place regarding donations a few significant facts have appeared. There is nothing to show that any consideration or benefit was actually received by the New York Telephone Co.; that the donations were necessary to provide proper telephone service at reasonable rates; that they reduced or eliminated expenditures that would otherwise be necessary; or that telephone subscribers, directly or indirectly, benefited to any degree by the charges.

Even if the expenditures did help to shorten the depression, there is not a word of testimony to indicate that by so doing any subscriber has been or would be benefited. These facts are most important when it is recalled that the law places the burden of proof upon the company to justify any charges that may be challenged.

Of course the nub of the matter is that by submerging those gifts in operating expenses, they will not be so apparent to any one who examines the reports of the New York Telephone Co. as they would if they appeared in the surplus account; and, further, that in any matter involving the reasonableness of rates of the New York Telephone Co., these expenses would be a charge against subscribers and not the stockholders."

Summary of Commission Rulings and Schedule of Hearings.

INTERSTATE COMMERCE COMMISSION.

March 18: Order issued approving the acquisition by the Southwestern Bell Telephone Co. of the properties of the Creve Coeur Mutual Telephone Co., situated in the village of Creve Coeur, St. Louis county, Missouri.

March 21: Order issued approving the acquisition by the Southwestern Bell Telephone Co. of the properties of the Ballwin Mutual Telephone Co. situated in the village of Manchester, St. Louis county, Missouri.

ALABAMA.

March 17: Alabama Utilities Co. authorized to purchase the Alabama telephone properties of the South-States Utilities Co. which has operating headquarters in Fayette.

March 29: Order rescinded which authorized sale of Alabama properties of South-States Utilities Co. to Alabama Utilities Co. Case restored to docket "for such further hearing and consideration as the commission may find to be just, necessary and reasonable."

CALIFORNIA.

March 29: The Pacific Telephone & Telegraph Co. filed application to adjust rates at its Gonzales exchange, Monterey county.

ILLINOIS.

March 28: Authorization granted the Illinois Commercial Telephone Co. to purchase all outstanding capital stock, property and assets of the Highland Telephone Co., of Highland, Madison county, and the Inter-County Telephone Co., of Mt. Olive, Macoupin county, involving a consideration of $150,000, free of liens, excepting $39,960.22 liabilities to be assumed by the purchasing company.

The new owners were authorized to issue and sell 2,521 shares of $6 cumulative preferred stock without par. The new operating company was ordered to continue in effect rates charged by the former companies in their territories.

KANSAS.

April 4: Hearing in Topeka on application of the Farmers Union Telephone Co. for permission to sell its telephone plant and property at Byers.

April 4: Hearing in Topeka on application of the Farmers Union Telephone Co. for permission to sell its telephone plant and property at Iuka.

April 21: Hearing in Lancaster, Atchison county, on complaint of the Lancaster Telephone Exchange against the service now offered and having been offered and given by the East Kansas Telephone Co. at Lancaster.

Floyd M. Brown, of Lancaster, is the complainant, and the Lancaster Telephone Co., of Lancaster, respondent.

April 27: Hearing in Collyer, Trego county, on complaint of Y. A. Palkowsky against the Collyer Telephone Co.

May 12: Hearing in Basil, Kingman county, on complaint of the Alameda Telephone Co. vs. the Belmont Telephone Exchange.

MINNESOTA.

April 12: Hearing in Kerkhoven on petition of the Kerkhoven-Louriston Telephone Co., of Murdock, for a reduction of rates for switching service rendered by the Kerkhoven Telephone Co.

April 14: Hearing in Wadena on application of the Verndale & Southwestern Telephone Co., of Todd and Wadena counties, asking for permission to disconnect its telephone line from the Verndale Telephone Exchange and operate the line for the local use of the stockholders and renters.

MISSOURI.

March 29: In regard to complaint of the public service commission vs. the Urbana Telephone Co. and the Osage Valley Telephone Co., the Urbana company was directed to improve and rehabilitate its plant and property in order to render adequate, satisfactory and dependable service; the Osage Valley company was ordered to repair its toll line between Urbana and Preston, and improve and rehabilitate its telephone plant and property used in rendering long distance service as will enable it to render adequate telephone service. The order specified improvements be completed on or before 60 days from effective date of the order.

March 31: Approval granted application of the Middle States Utilities Co. for authority to render telephone service to its subscribers at St. Patrick, through its exchanges at Kahoka or Wayland.

NEW YORK.

March 30: New York Telephone Co. directed to eliminate all its gifts to charity from operating expenses and charge them against corporate surplus. The order relates to all gifts in the past three years as well as to all future gifts.

NORTH DAKOTA.

March 9: Approval given the schedule of reduced telephone rates of the Smith Telephone Co., filed applicable to Sarles.

March 9: Approval granted the joint application of the Haaland Telephone Co. to buy, and the Bowdon Telephone Co. to sell, farm line No. 10.

March 9: Commission granted the joint application of the Lincoln Telephone Co. to buy, and the Bowdon Telephone Co. to sell, farm line No. 1.

March 9: Approval granted the joint application of the Progress Cooperative Telephone Co. to buy, and the Bowdon Telephone Co. to sell, farm line No. 2.

March 9: Commission granted the joint application of the Ontario Telephone Co. to buy, and the Bowdon Telephone Co. to sell, farm line No. 3.

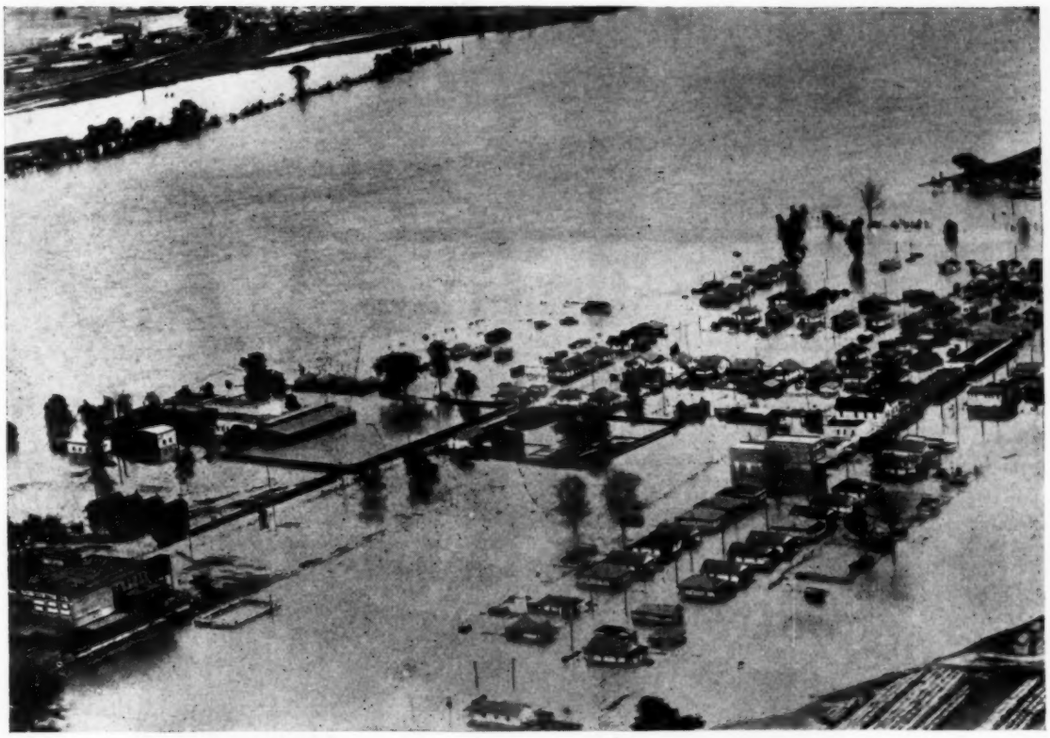
March 9: Approval granted the joint application of the North Line Telephone Co. to buy, and the Bowdon Telephone Co. to sell, Farm Line No. 4.

WISCONSIN.

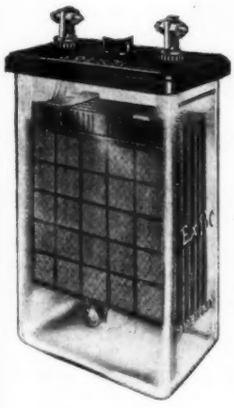
March 23: The Iron Belt Telephone Co., Iron Belt, authorized to abandon and eliminate its lines 14 and 15 out of its Iron Belt exchange. One of the lines ran as far as Montreal, Wis., and the other as far as Pence, Wis. Only four subscribers were on the lines.

March 23: Permission to issue $6,000 worth of stock given to the Nelson Telephone Co. The company made application for the permit, stating that the $6,000 were needed for paying off outstanding indebtedness and for a stock dividend.

April 1: Hearing at Madison, the first of series in the state-wide investigation of rates, rules, service, practices and activities of the Wisconsin Telephone Co. The investigation was inaugurated following an order of the commission on July 29, 1931. Action on the petition of the Wisconsin Telephone Co. for authority to increase its rates on the Madison exchange was postponed by the commission pending conclusion of this investigation. Testimony taken of John Bickley, auditor, employed by commission. He testified as to company finances during the 48 years of the company's existence, showing that it had never operated at a loss.



BEFORE THIS TOWN WAS FLOODED



A typical cell of the Exide Chloride Battery so widely used in telephone service.

. . . the load on the local telephone equipment reached a "high water" mark with emergency calls, warning of the swift advance of flood waters. These telephone warnings gave families time to move valuable household goods to upper floors and seek personal safety on higher ground. The telephone company again served the community.

It is the unusual stresses of emergency conditions that test the dependability of all telephone equipment, including the storage battery. It must not fail.

Since 1895 Exide Telephone Batteries have successfully weathered the severest kinds of emergency tests in every type of telephone service—in some instances even continuing to operate though submerged. They are especially designed and constructed for telephone work. They assure unfailing service for long periods of time. That is why Exide Telephone Batteries have won the confidence and acceptance of telephone companies throughout the country.

Exide
TELEPHONE BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

THE WORLD'S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE

Exide Batteries of Canada, Limited, Toronto

Showing

GOLD

IN THE GOLDEN PAGES OF THE *Telephone Book*

The classified telephone book clinches the sale by telling your prospects "WHERE TO BUY IT"

Many a "sale" that national advertising makes gets lost on the road to market. Lost—or kidnaped by competitors!

"See your local dealer" says the advertisement. But that's much too vague a phrase to ring the dealer's cash register. Prospects are apt to let the matter drop right there.

The "Where to Buy It" pages of the telephone book can clinch the sales that your advertising makes. For in those pages the dealers selling your product can be listed under your trade mark. Then if your national advertising and broadcasting direct readers to these local listings, the circuit is complete.

A feature of the plan is that you need take listings only in those communities where you have distribution.

Look in the classified section (the golden-yellow pages, in most telephone books). Look

for Goodrich under tires, for Stromberg-Carlson or R. C. A. under radios. Or Mimeograph, Addressograph, Sherwin-Williams, Raybestos, Corona or any of the other "Where to Buy It" users. See just how this plan is followed by some well-known advertisers.

Then apply this principle to your own sales and merchandising problem. Surely, you'll agree that there is "gold in the golden pages" for you, too!

For data on rates, coverage, dealer tie-ups, etc., inquire of your agency or as directed below.

WRITE OR TELEPHONE Trade Mark Service Manager, American Telephone and Telegraph Company, 195 Broadway, New York, N. Y. (EXchange 3-9800)—or 208 W. Washington Street, Chicago, Ill. (OFFicial 9300).

The original of this advertisement appears in two colors

usiness how to get

GOLD

ut of golden pages

AN important factor in the distribution of a nationally advertised trade marked product or service is the directing of prospective buyers to authorized local dealers and service stations.

To acquaint sales and advertising executives and manufacturers with the possibilities of the "Where to Buy It" feature of classified telephone directory as a medium for listing their local dealers, a series of advertisements, similar to the one reproduced on the opposite page, is being run in a list of national business and trade papers. Usually the illustration features the familiar yellow pages of the classified directory, with a close-up view of an actual trade mark heading.

Copy stresses the merchandising advantage of making it easy for the public to find out where to buy nationally advertised goods.

Today, more than ever, this advertising should interest merchandising executives, and its effect should be reflected in the greater use of the classified pages of telephone directories throughout the country.

AN ADVERTISEMENT OF THE AMERICAN TELEPHONE AND TELEGRAPH COMPANY

Wiring Plans for Substation Apparatus

Auxiliary Substation Equipment Now Used by Practically Every Company in Connection With Extension Telephones, Ringers, or for Holding and Switching Calls—Some Suggested Wiring Plans to Show How the Apparatus Is Used

By R. C. Chock,

Engineering Department, American Electric Co., Chicago, Ill.

Today, virtually every telephone company is using auxiliary substation equipment to some degree. Many companies have found that simple switching key arrangements for cutting off extension telephones or ringers will satisfy the needs

A Type of Switching Key Commonly Employed in Wiring Plans.

of most of their users. Others are employing more elaborate equipment which enables subscribers to pick-up, hold and switch calls. In many instances, telephone companies are installing separate buzzer systems for signaling which operate entirely independent of the telephone circuits.

The value of special service plans provided by auxiliary substation apparatus cannot be questioned. They fit telephone service to the users' specific needs—and consequently make the service more valuable to the subscriber. From the telephone company's standpoint they have a double benefit: First, in that they increase the company's income; second, in that they are of great assistance in the company's commercial work or "sales efforts."

The commercial man who demonstrates "special services" to present or prospective subscribers might be likened to the automobile salesman who elaborates on the car's accessories. Often the relative value of these accessories is infinitesimal as compared to the benefits of the car itself—yet they are highly instrumental in closing sales.

Women, in particular, are swayed in their judgment by the little "extras"—and we have all seen the expert automobile salesman dramatize the individual appointments of a particular model to the feminine members of the household while the mere male pours over the specifications or walks around appraising the car with an occasional kick at the tires.

Does this salesman waste time talking about the benefits of automobiles to family life? Of course not. He carefully avoids generalities and goes straight to the point by concentrating on personalizing the tangible features of the car until he makes them seem indispensible. And, moreover, he gets results.

Similarly, the telephone salesman armed with "special service" plans can approach the prospective user with the assumption that the prospect is fully conversant with the general benefits of telephone service. It is the salesmen's job to tailor the company's service and equipment to fit the individual's requirements. Because these plans are new to subscribers and prospects, it is comparatively easy to arouse their interest.

If the salesman discovers that his listener is not thoroughly sold on the benefits of telephone service, he has an excellent opportunity to present the complete story—emphasizing, of course, the particular arrangement or plan which seems best suited to the specific needs.

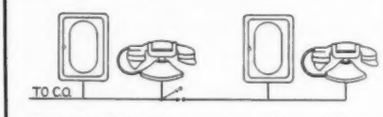
Often this apparent "custom building" of telephone service will prove the most effective argument in signing up new users—even outweighing much more valid reasons for the installation of service. And after all, it is only a trial that the telephone company seeks, for if care is taken to see that those facilities which best serve the user's interests are provided, the company need have no fears regarding the continued satisfaction of the subscriber—regardless of his or her original reason for wanting the service.

It must be kept in mind, however, that if "special services" are to be offered to all subscribers, it is not only desirable, but almost necessary to have complete standardized plans utilizing certain pieces of equipment and identified by some such label as "Plan A," "Plan B," etc. The reasons for having such plans are two-fold: First, the obvious one of avoiding maintenance difficulties where "unstandard" wiring is installed; and second, to avoid having subscribers misunderstand the charges for auxiliary substation equipment.

If, for example, a subscriber is furnished with one switching key at a flat rate, it does not necessarily follow that two keys can be employed in this same circuit at double the rate. Perhaps a relay will be required for holding calls. In the second instance the wiring will be much more complicated and costly to the company.

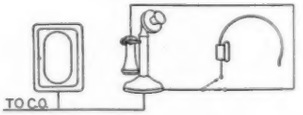
It is much better to have a variety of standard plans—each carrying a flat rate, and to select the one which will fulfill the user's requirements. Where the company now has some auxiliary apparatus installed, the process of replacing existing wiring arrangements with standard wiring plans must, of course, be a gradual one. When the opportunity occurs, however, a standard plan should be recommended to the subscriber to take the place of the one now employed.

Space will not permit to illustrate more than a few of the score or more of wiring plans available with the use of switching keys, holding keys, etc. For the purpose of assisting companies who are not now using auxiliary substation equipment to any extent, the following six suggestions will



Suggested Plan "A." Use: Where the Subscriber Desires to Cut Off Extension Station.

Suggested Plan "B." Use: Where Subscriber Desires an Extension Bell Which He May Cut Off.



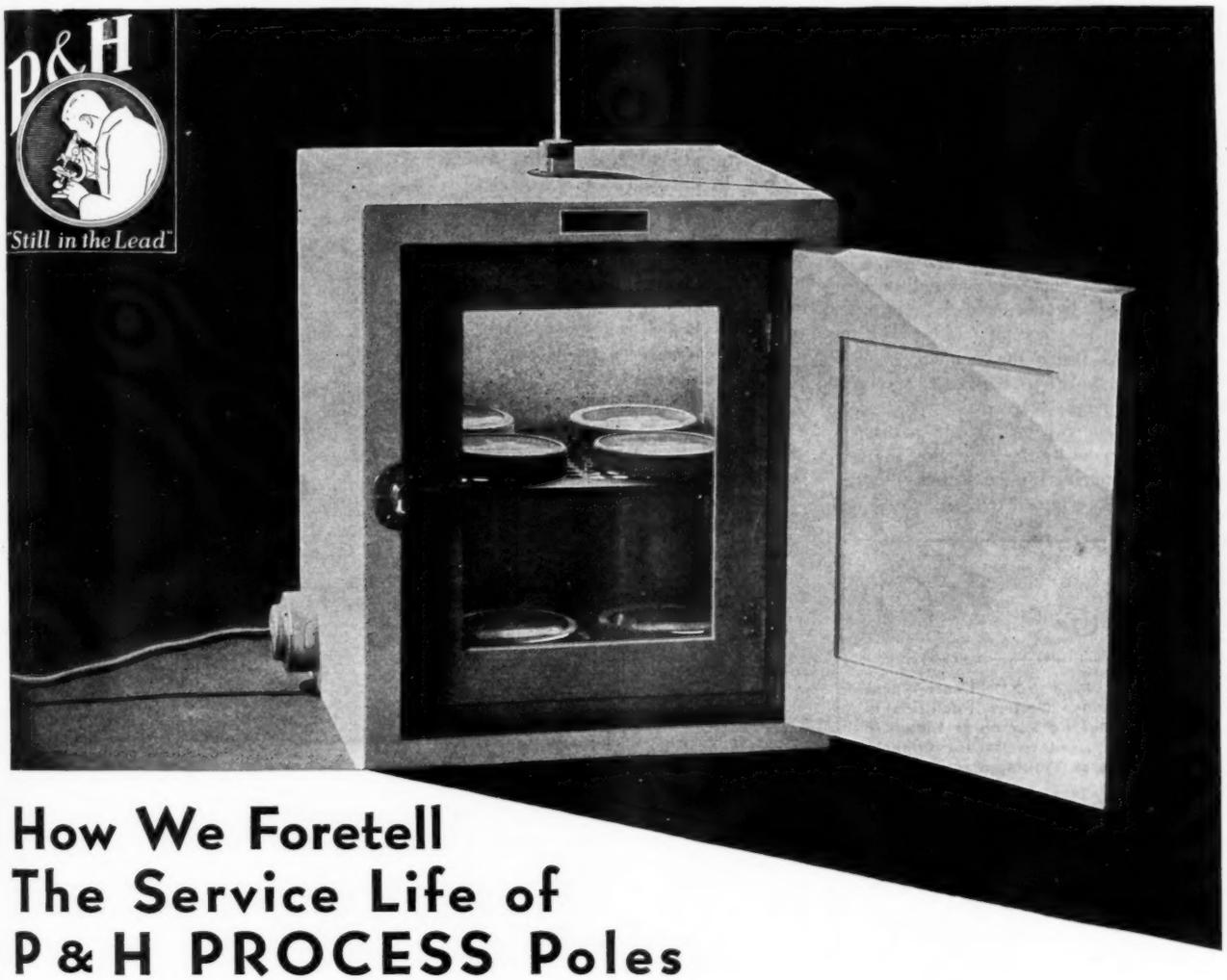
Suggested Plan "C." Use: Where Subscriber Desires to Be Able to Use Either Hand or Head Receiver.

A Few Suggested Wiring Plans Which Will Add to the Flexibility of the User of Subscribers' Station Apparatus.

serve to show how this apparatus is employed in making up such plans:

Suggested plans *A*, *B*, *C*, *D* and *E* are of the simplest sort using only the two or three-way switching key and can be used in automatic, manual common battery or magneto exchange areas. Plan *F* utilizes

CEDAR IS THE NATURAL POLE WOOD



How We Foretell The Service Life of P & H PROCESS Poles

FIELD tests show the soundness of the groundline area of "P & H PROCESS" poles. The condition of the treated wood and the protective value of the creosote remaining in the poles is determined in our laboratory from field samples. The culture chamber and incubator are used for this purpose.

By means of this laboratory apparatus, we are able to accelerate actual line service conditions. Thus physical changes which may take place over a long period of years in the line are revealed in our laboratory within a few months.

The result of these combined field and laboratory tests show that, **after 11 years of service in the line, the first "P & H PROCESS" poles installed (1921) still have abundant protection for many more years of service.**

It will pay to build your lines with "P & H PROCESS" poles carrying the **P & H Double Guarantee of at least 36 pounds saturation and one-half inch sapwood penetration throughout the groundline area.**

NEW YORK, N. Y., 50 Church Street
BOSTON, MASS., 733 Public Service Bldg.
PITTSBURGH, PA., 1210 Grant Bldg.
DAYTON, OHIO, 854 Reibold Bldg.
CHICAGO, ILL., 20 No. Wacker Drive Bldg.
KANSAS CITY, MO., 2300 Power & Light Bldg.
OMAHA, NEB., 711 Electric Building

PAGE AND HILL CO.
MINNEAPOLIS, MINN.

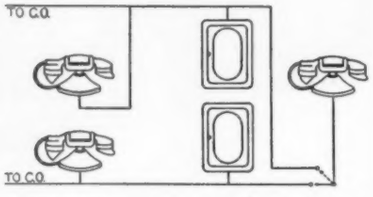
When communicating with Page and Hill Co., please mention TELEPHONY.

relays with associated holding keys and is limited in its application to central battery exchanges.

Plan *A* is one that scores of companies have been employing for years. This plan enables the subscriber to cut-off one or more extension stations. The switching key is placed at the main station; and when in a normal position, all stations are connected to the line. When the key is operated, the extension stations are entirely cut off of the line.

A typical application is found where an executive desires privacy when discussing certain matters by telephone, but at other times wishes his secretary to answer incoming calls. When the switching key is in a normal position, both the executive and the secretary can make or receive calls. When a call of private nature is made or received by the executive, the key is operated, cutting off the secretary's telephone. Here, a buzzer circuit, while not

Suggested Plan "D." Use: Where the Subscriber Desires Facilities to Enable a Second Person to Listen in (Generally Used to Record Conversation of Talking Parties).



Suggested Plan "E." Use: Where Subscriber Desires to Have One Station Equipped to Pick Up Either of Two Central Office or P. B. X. Lines.

Suggested Plan "F." Use: Where Subscriber Wishes to Have One Station Equipped to Pick Up and Hold Either of Two Central Office or P. B. X. Lines.

These Suggested Wiring Plans Show That Subscriber's Equipment May Be Inter-connected in Many Different Ways.

essential, might be convenient to enable the secretary to signal the executive when a call is received that requires his personal attention.

A variant of plan A that also has wide application, controls the ringer at the main station as well as the extension. With this arrangement, when the key is in normal position, the ringer (but not the instrument) at the main station is cut off from the line and the extension is connected to the line. By operating the key, the subscriber can cut off the extension and connect the ringer of the main station to the line.

This arrangement can be used in homes or apartments where the main station is located in the bedroom and an extension located in the kitchen. When the key at the bedroom telephone is in normal position, the bell is cut off, which avoids disturbance from the bell at night or during the day when quiet is desired, but the instrument is not disconnected and calls may be made or answered from that station as well as from the extension.

As a good part of the housewife's time might be spent in the kitchen, the extension there offers great convenience in her daily work. However, when privacy is desired, by operating the key, the bedroom ringer is cut into the circuit and the extension will be cut off.

Plan *B* permits the subscriber to cut off an extension bell when it is so desired. As it might be considered undesirable to have an extension telephone in the servant's room, an extension bell serves the purpose of notifying the servant of an incoming call when the employer is out. When the employer returns, the extension bell can be cut off at the main station.

Plan *C* is designed to meet subscriber's needs, where, on specific occasions, the use of both hands is required during a telephone conversation. When the key is in the normal position, the hand receiver is connected to the associated station. When the key is operated, the hand receiver is cut off and a head receiver is connected to the station.

A typical example of the use of this plan is found in an office where the secretary answers and receives calls in the ordinary manner, but, who also upon occasions, is required to take dictation over the telephone. The operation of the key will connect the head receiver and both hands are free to write and sort correspondence.

Plan *D* can be used where the subscriber desires facilities to enable a second person to listen-in—generally for the purpose of recording the conversation. With the key in a normal position, the listening set is cut off; and with the key operated, the listening set is connected to the line. Either a jack and plug arrangement may be provided or a head receiver may be connected to the line permanently.

This plan will appeal to executives who wish to have privacy when personal conversations are conducted.

Where the subscriber wishes to have one station pick up either of two central office lines, plan *E* offers an easy and satisfactory solution to the problem. It is the most generally used of all such wiring plans. When the key is in normal position, the main station is connected to the first line. When the key is operated, the main station is disconnected from the first line and connected to the second.

A common application is found in doctors' or dentists' offices. A secretary in an outer office can take care of both lines and make the necessary appointments or signal the correct individual if the call requires his personal attention.

The foregoing plan has certain disadvantages, however, if the dentists or doctors have extensive practices and the traffic is heavy. Often they will be working and will be unable to answer calls promptly and hence will delay the answering of calls on the other line.

Plan *F* overcomes these disadvantages. With this plan, a switch box with four push-type keys is installed with the necessary associated equipment. Operating the first key connects the first line to the main station. Operating the second key, holds this line. Operating the third key connects the second line to the station, and operating the fourth key holds this line.

In this manner, all calls are promptly answered by the secretary and she can ask the caller to wait until the doctor is free to give his personal attention.

These suggestions are not intended to be even an index of the many plans which can be evolved, but future articles dealing with specific types of auxiliary substation apparatus will give a comprehensive listing of the plans possible and the circuits and modifications required with certain types of existing substation equipment.

Answers to Traffic Questions Presented on Page 16.

1. If the distant operator reports "LF," say, "Right." If the calling party is not holding the line and you have not already given him a report, or if he is still holding the line, give the report, saying, for example, "I am sorry, there will be a slight delay on your call. I will call you." Continue to hold the circuit until someone answers at the called station. However, at the end of three minutes from the time you received the "LF" report, if you have not received an answer reach the TTC operator, say, "Call operator (number of proper point-to-point position) at (name of your office) (called number) LF," clear the toll circuit, release the calling line, and send the ticket to the proper point-to-point position.
2. No.
3. Say, "I will try it again." Change cords and try to establish connection again as on a new call.
4. "Transferred to (new OTC) (time)" is entered under the last entry on the ticket. "Cov" is entered on the face of the ticket at the top.
5. Yes.

Help your Operators cut toll losses

IN spite of the world-wide reputation of the Calculagraph, there is still an occasional telephone manager who appears not to appreciate in full the importance of this instrument as a safeguard against toll charge losses.

He is apt in all good conscience to place the blame on his toll-board operators—which is hardly fair, when the Calculagraph is so easily available. Operators with nothing but a time-of-day indicator and a pencil cannot be expected to provide 100% accuracy in their busy work. But you can demand 100% accuracy from the Calculagraph **at all times**—and get it!

With utmost precision, the Calculagraph mechanically computes and prints ELAPSED TIME. A pull of the handle clearly and indelibly stamps **on the toll ticket** the time of day of each call, also the actual ELAPSED TIME the circuit is in use, for any number of calls. No arithmetic by pencil—no diversion from other duties—no chance of error—the Calculagraph is easily and quickly operated while conversing with either the calling or answering party. The Calculagraph is now supplied in either the well-known spring-driven model or an electric-driven model operated by electric impulses from a master clock (24 or 48 volts), or by self-starting synchronous motor (60 cycle A. C.). Prices and detailed information on request.

THE CALCULAGRAPH COMPANY
50 Church Street Dept. 16 New York City

CALCULAGRAPH

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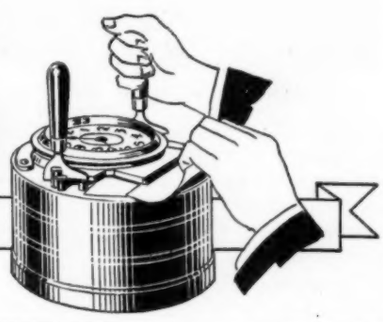

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Reduce Outgo to Balance Reduced Income

Kinks in Outside Plant Preventive Maintenance Which Save Labor, Money and Material in Clearing Trouble Later—Sometimes the Best Way to Save Money in Plant Maintenance Is to Spend Some—Some Practical Illustrations

By Ray Blain

In these times of reduced revenues there is a natural tendency on the part of everyone engaged in the telephone business to reduce expenses in every way possible. New construction and equipment replacement have been reduced to a minimum.

When income shrinks, it is of course only natural for any company or individual to attempt a reduction of expenses by at least an equal amount. It seems, however, that some in the interest of economy lose sight of the fact that units of their plant have an economic life. In other words, when a unit of plant depreciates to such an extent that maintenance costs increase beyond a reasonable figure, it is time to make either an extensive overhaul or replacement.

It is believed that some in these times of depression, in a wild attempt to eliminate construction and equipment replacement and at the same time reduce maintenance costs, do not in all cases follow a sound economic practice.

As an example suppose aerial cable depreciates 5.7 per cent annually and repairs average 3.2 per cent. If repairs increase to 15 per cent, it would indicate that some corrective action is necessary. Also if central office equipment ordinarily depreciates 7 per cent and requires annual repairs of 7.4 per cent and should these repairs increase to 15 or 20 per cent, it would probably indicate that extensive repairs or new equipment were in order. These are only arbitrary figures and may not apply to your exchange, for they only present an average condition.

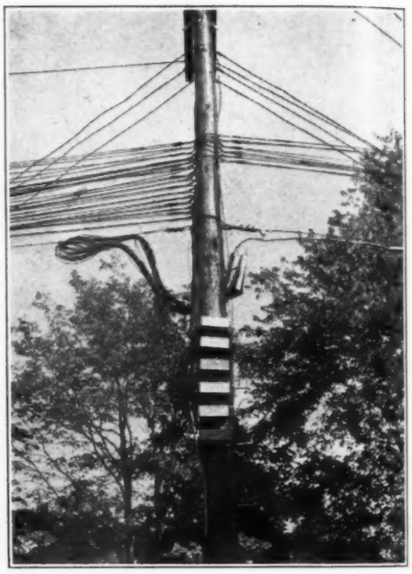
The usual procedure, under normal conditions, with most telephone companies in to make a certain percentage of plant and equipment replacement annually. When this program is not carried out and maintenance is reduced to a minimum, there is a possibility that the exchange will depreciate to such a point that the reconditioning will cost more in a lump sum later, than it would have had the original system of replacement and regular maintenance been carried out.

It is believed that when new construction and replacement of equipment have been reduced to a minimum, or eliminated, some special maintenance measures should be instituted to prevent the general condition and efficiency of the exchange from reaching a point which is not in keeping with sound telephone practice.

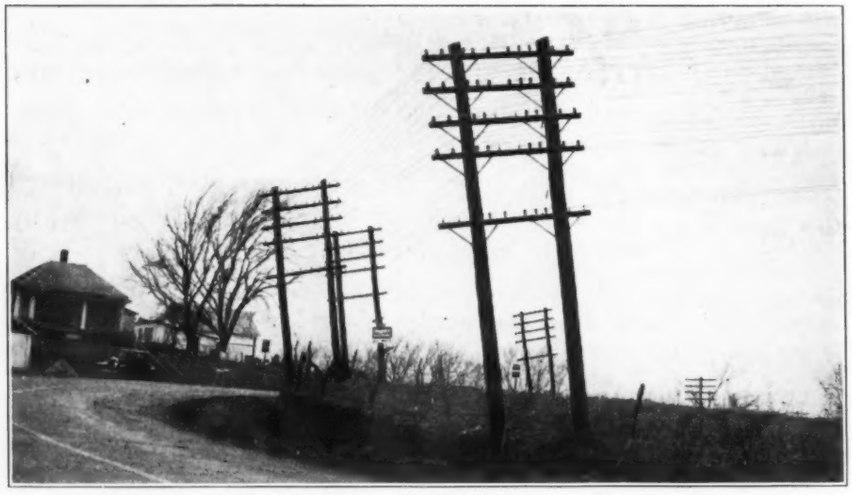
There are many kinks in outside plant maintenance which, during times like the present, can be practiced to good advantage and successfully delay new construction. Even though money is scarce, a small investment in labor and material on preventive maintenance will in most cases save a much greater amount than would necessarily be spent in clearing trouble later.

Broken poles should always receive immediate attention as they are liable to cause no end of trouble, or possibly lawsuits. When height of poles and clearance permit, they may be reset. When a pole cannot be reset it should be either replaced or stubbed. The stub should always be practically as strong at the ground line as the original pole itself.

Stubbing clamps are now available which will prove a good investment as they are much stronger and easier to install than the old style wire wrap and bolts. The stub for a 20 or 25-foot pole should be about nine or ten feet long. The stub should always be set in the ground about as deep as was the original pole.



To Avoid a Cable Extension, Heavy Runs of Drop Wire Were Strung. The Wisdom of Such a Procedure Is Questionable from An Economical Standpoint and Also As a Matter of Appearance.



A Corner Which Was Properly Rebuilt to Stand for Many Years.

Many cases of trouble on open-wire leads can be prevented at a comparative small cost by pulling slack, replacing broken pins, brackets, crossarms and insulators. Tree trimming also always proves a good investment to obtain proper clearance.

Preventive maintenance of drop wire is also money well spent. It is generally a good plan to go over the drops in an exchange and pull them up, in the event that they have excessive slack. If the insulation on the wires is broken where the old tie gripped, it should be repaired with friction tape. If old splices are not properly made, they should be retaped or remade if necessary. If possible all spans over 200 feet should be shortened.

Many drops will be found with a bad section only a few feet long and the remainder comparatively sound. In such cases, in the interest of economy, a short piece of drop wire can be cut in and the life of the drop extended several years. If drops are in or near trees, the trees can be trimmed to provide ample clearance or the wires rerouted, for trees, everyone knows, are the most deadly enemy of drop wire of any type. Proper clearance should

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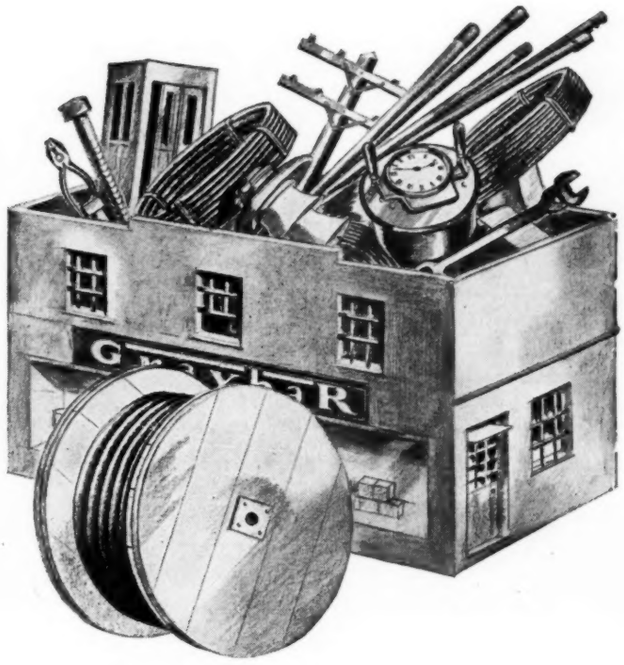

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be observed over streets and roadways to prevent drops being broken down.

Correct cable protection should always be observed as a five-dollar protector may prevent a hundred-dollar damage to cable. Leaving long-exposed lines unprotected where they enter cable is not advisable, even in times of depression. All cables should be checked over and missing rings replaced, and splices retied if they need it. Stubs of terminals should be formed properly and the necessary amount of slack provided so that the stub does not pull against the cleat on the pole.

Some companies follow the practice of clearing cable trouble and then covering the place opened with several layers of friction tape and paint, instead of wiping on a lead sleeve. While this method is satisfactory for temporary repairs, generally it is not absolutely water-tight when left in service for an extended period. A check up of the cable system and a small amount expended to have a splicer put lead sleeves on all taped places, will in most cases prove money well spent.

It is not generally believed good policy to economize on the maintenance of subscriber's station equipment at any time, for such economy will generally react to the disfavor of the telephone company. A telephone will operate without a mouthpiece, but a subscriber expects a new one on his telephone even though he breaks it through his own carelessness. A telephone will also operate after a fashion with a broken receiver cap held on with adhesive tape, but most subscribers will not tolerate such a condition very long and still maintain a good opinion of the telephone company.

Noisy cords will give inferior service and should generally be replaced as soon as detected. About the only maintenance which can be eliminated on the subscriber's equipment in the interest of economy is the outer finish, and it is not usually a good policy to ignore requests of subscribers to replace badly-worn instruments.

Considerable saving can generally be effected in the central office by making more repairs than replacements. Switchboard cords can be rebutted so long as their length will permit. They are ordinarily thrown away when about half worn-out.

Most switchboard men seem to think that plugs should be thrown away the instant they have worn enough to permit them being crowded into a "don't enter" gauge. As a matter of fact, such plugs will give good service for an indefinitely longer period before they have worn enough to enter the gauge easily and cause trouble. This also applies to jack sleeves.

The usual practice is to have a coil of flameproof wire on a reel near the main frame and to run all new jumpers from it. Considerable saving can be effected by keeping the old jumpers as they are removed and using the longer ones, when they will reach, in running new jumpers rather than taking wire off the reel.

Paradoxical as it may seem, sometimes the way to save money is to spend some. The old storage battery in a fair-sized exchange recently showed such signs of failure that its replacement was imperative. Rather than purchase a complete new battery it was decided in the interest of economy to replace the elements with new ones of the same size, change the separators, but reuse the old jars and electrolyte. It was estimated that these repairs would cost about $100.

One man did not approve of the idea of spending this amount on the old style battery, so he started to investigate. A recording ammeter was hooked up; and the discharge charts over a period of several days indicated that the exchange would operate satisfactorily on a considerably smaller ampere-hour battery. Also by charging on a modified floating basis, a reserve sufficient to cover any possible power failure could be maintained with the smaller battery.

The result was that a new, sealed-type glass jar battery with all accessories was purchased for about $70. This new battery is proving entirely satisfactory in every way, the messy job of overhauling the old battery was avoided and about $30 saved.

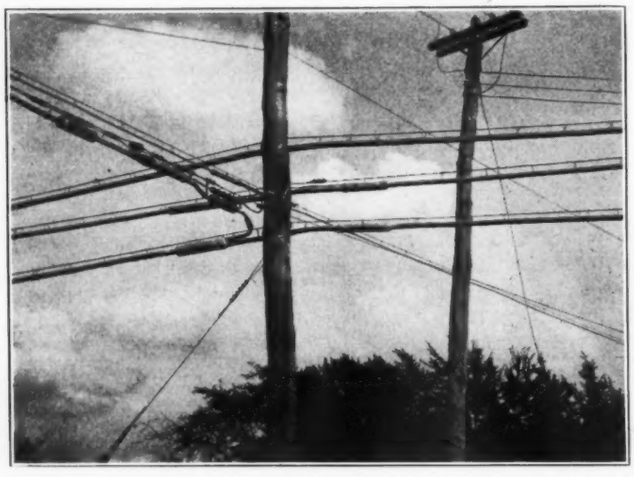
Another company possessing an unusual amount of nerve, even though prosperity is around the corner, made a study of the new trickle chargers which are now available for telephone exchange battery charging. They found that it would be to their interest to remove certain of their old charging equipment and install the new type trickle chargers.

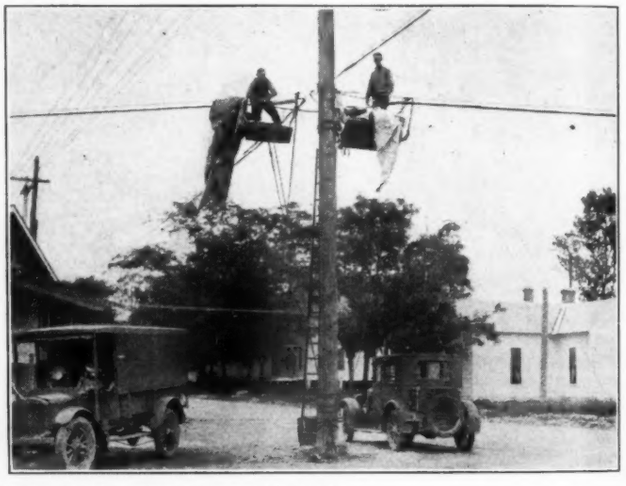
The saving in current consumption alone, it was figured, would pay for the new trickle chargers in a reasonable period of time, and no doubt the life of the batteries would be extended several years by the adoption of trickle charging. Some of the old style charging machines are very inefficient, and the manually-cycling method of charging as usually practiced cannot be considered from an efficiency standpoint, even in times of depression.

There was a case with another telephone company which, due to the moving of a certain business establishment having a number of telephones to a street not having a cable lateral on it, had the question come up as to whether a cable extension should be built. It was finally decided, in line with the company's strict economy program, to string about 12 parallel drop wires for a distance of about two blocks and thus avoid the building of the cable extension.

The wisdom of this move is questioned, for while it is true some money was saved at the present time, a cable will be required within a few years at least; and then the present drop wire, fixtures, and pole protectors will be almost a total loss. Added to this, the drop wire is very unsightly and will probably cause more trouble than would lines through cable.

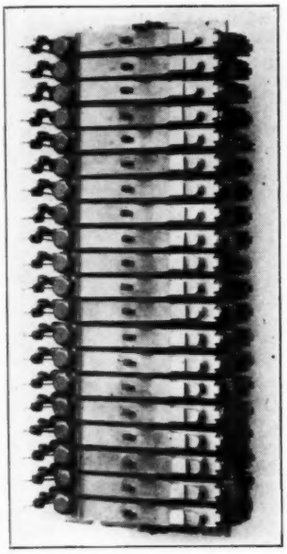
One cannot blame any company for saving money at every possible turn, but whether to spend, how to spend and what to spend it for, should be carefully considered from every angle in each individual case.





Old Cable, But in Good Condition—Splicers Making Repairs on Old Cable.

ADDITIONS TO CENTRAL OFFICE



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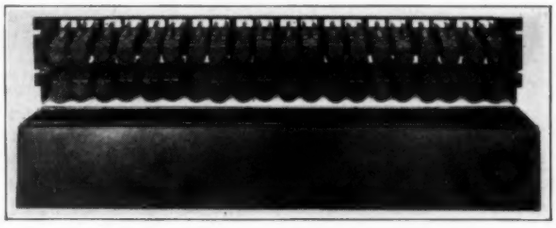

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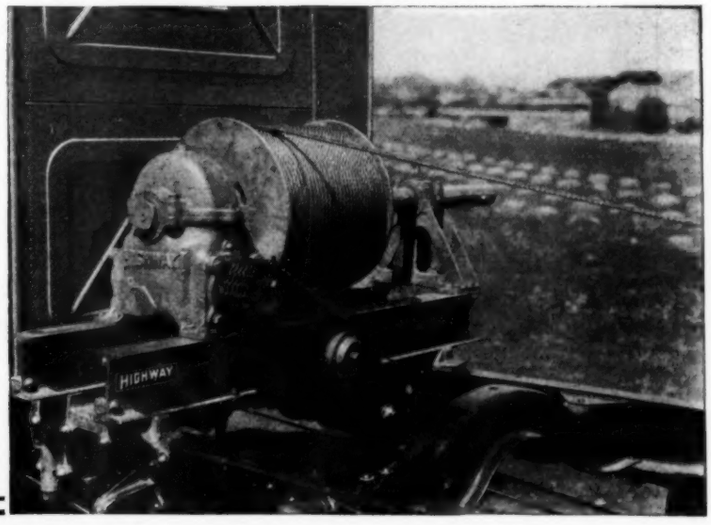


Underground Cable Placed in Tile Duct

Method of Installing Clay Tile for Underground Cable—Protects Cable From Attacks of Gophers—Special Tile Duct Is Laid Above Frost Line—No Water or Freezing Trouble Experienced Because of Porosity of Iowa Soil—Low in Cost

By W. H. Daubendiek,
Secretary, West Iowa Telephone Co., West Bend, Iowa

The sleet storms which passed over Iowa in December, and also the storms of last month, causing severe damage to the heavy open-wire leads of many operating companies, bring forcefully to mind the matter of underground construction.

This is no new subject, but we slip along nicely for a number of years without much sleet disturbance and sort of go to sleep on this matter, thinking perhaps that our big leads, even though they are getting a little old, will stand up all right. But when all go into a tangled mess, three feet under snow and ice and taking many days to untangle them, it does not set well, together with a loss in service.

This subject was on our program a year ago quite strong, with the result that we made considerable study of just how to handle it. It is true that today we find many of the larger companies placing long toll leads underground; but how about the average company with its two, three and sometimes four-arm leads running into the country, usually in four directions from the towns?

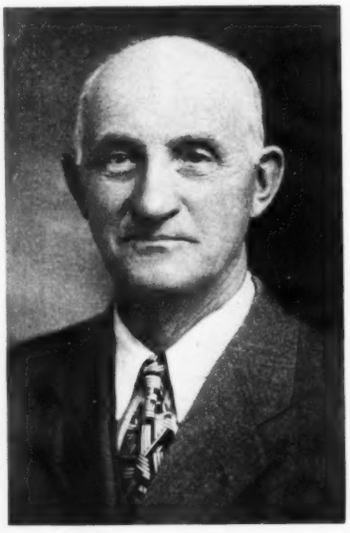
Two years ago the activities of the high tension power lines in all directions made it plain to most operating companies that sooner or later all farm circuits must be metallicized. While some of this work has been temporarily halted due to financial conditions, this matter of making grounded circuits metallic evidently will come to the front again.

Many of the operating companies have adopted various methods of installing cable of 50 pairs or less for just such farm-lead construction, with various results. The point of cost is, of course, the first and foremost item to consider; next the stability of the investment. If a mile of 30-wire country lead is to be replaced with cable, what is the final analysis as to cost of installing such cable and the yearly depreciation afterwards? These questions weigh quite heavily in the decision regarding the undertaking.

The proper size of conductors that must be employed, and many other questions come up for consideration. How deep such a cable must be placed to be out of danger of damage and how this cable can best be protected from damage are other questions.

Cable manufacturers have now a protected cable on the market which would seem to fit the bill. If we look into the question a little closer we find that there are objections which can be brought against burying a protected cable in open ground. One such objection would be that it is not of easy access for repairs; next that it is not easy to recover if that should be desired in the future; and last but not least that it is quite expensive in first cost.

Many of the Independent operating companies have placed cable underground



Mr. Daubendiek Believes Tile Duct Offers An Economical and Satisfactory Protection for Underground Lead-Covered Cable Under Conditions Obtaining in His Section.

treated with asphalt compounds and wrapped in paper to avoid chemical action from certain elements in the soil. Gophers are no respecters of such coverings and cause trouble. Some have placed lead cable direction in the ground without any protection whatever. In very sand ground where gophers can not operate, this may have been successful, but it will not work out in northern Iowa where apparently there may be a gopher to every square yard of soil, especially near an alfalfa field.

Some companies have laid lead-covered cable in cement. This is no doubt very efficient when it comes to ordinary protection, but what about the question of recovering that cable some day?

Having in mind all of these facts in regard to the laying of such cable, the writer cast about for a more permanent and suitable protection which would be reasonably cheaper that the ordinary method and also provide an easy recovery of the cable if desired. This was found by employing a specially-made burned clay tile, scored on the inside. The tile is 12 ins. long, 4 ins. outside diameter and 2½ ins. inside with a ¾-in. wall.

We find in handling this tile that it is very substantial and there is little breakage. If the tile is laid on the ground with the score straight up, one blow with a suitable one-pound hammer will split the tile in two parts.

Preparing the Ditch.

We have found that a suitable ditch can usually be provided along the public highway about three feet from the 66-foot line inside the highway. This may not be possible along main highways where grading is often done close to the 66-foot line. In such case perhaps a private right-of-way, just inside the fence line, might be secured from the land-owners.

The depth of the ditch can be best judged by conditions. On ordinary ground we find that two feet is deep enough; where the ground is very low, it might be best to lay the tile not over 18 inches deep. Under road crossings it should, of course, be much deeper.

The one thing to bear in mind in laying tile of this kind is that it must not be too deep as water will then lay in the tile and freeze. Water can get out each joint if the tile is not laid too deep. There is no advantage in laying it deep as that does not make it any better or safer. Water in northern Iowa will not stay on the surface long as Iowa soil is porous. Water will never go into a ditch and run along it. That is why Iowa soil must have tile laid deep to drain it. Drainage tile is now placed five feet deep practically all over Iowa. If we lay our cable two feet deep or less we should be perfectly safe.

The tile, as just stated, need not be below frost line because freezing can not hurt it, being in two parts. There is no reason why it should break by freezing if any possible drainage exists. It will be found that even though we may have an apparently flooded condition of the ground, in a day or two the water will go down.

The ditch need only be a little more than one spade's width. Any ordinary workman can dig it with a tile spade; at the bottom a small crummer should be used to level the bottom.

The construction of manholes is not necessary and would make such work too high in cost.

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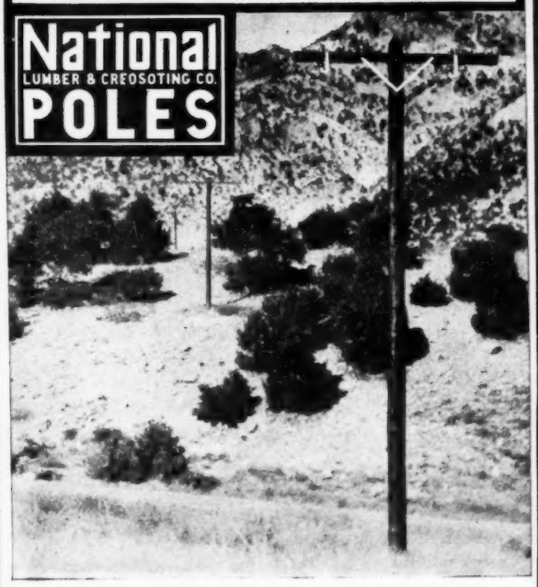

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When the ditch is dug, the tile should be laid alongside of it. Then a boy can step inside the ditch and break the tile, take off one part and place it in ditch. The top part is placed opposite the lower half until laid. When laying the top part, care must be taken not to reverse ends for then the tile would not fit.

When the lower half of the tile is all placed, the cable can be reeled off and placed alongside the ditch. Two men can follow up and lay the cable in the ditch in the tile. One man follows up and lays the top half of the tile, puts a little dirt along the laid tile, and the ditch is ready to fill in.

When it is necessary to splice the cable, it can be done without much expense, for it is only necessary to dig a suitable hole lower than the ditch, so that the cable splicer has elbow room. The dirt is tamped again and the hole closed.

When passing farmhouses and a drop is desired out of the cable, one splice and a piece of small cable and a pole with a suitable terminal are all that is required to make an all-enclosed telephone line to the farm home.

Tile of the dimensions given can be purchased at $20 to $25 per thousand. It has this advantage over other methods:

First, the cable is of easy access for future possible change, by simply removing the dirt and taking off the top half of the tile.

Laying Cable Underground in Tile Duct. Note That Duct Is Split Into Two Sections.

Second, the cable is positively protected against rodents. When properly laid and protected across the public highway and ditches, with some reinforcements it is practically in the dry the year around.

Third, recovery of any or all the cable is simple and inexpensive.

Fourth, the presence of tile around the cable is a considerable warning to parties who may wish to make a hole with a shovel, that there is something which should not be disturbed. We have had cable protected by an asphalt compound, cut in two with an axe by workmen because it was mistaken for a tree root.

One thing we have noticed is that there is quite an incentive for certain tree roots to enter the tile because of certain protection. Perhaps this is particularly true of willow. The tree roots may or may not be harmful to cable, but they could be kept out of the tile by placing a little cement over the joints, when passing such trees along the road.

During the past year we have placed nearly 50,000 feet of this kind of construction, and also have taken up some cable which was attacked by gophers and placed it in tile. This, no doubt, will be too hard for their teeth.

Such construction should put the management of the telephone exchange on "Easy Street" from storms and outside hazards and reduce the depreciation to a minimum. The cost of such construction is just a little more than that of a well-built pole lead but maintenance is less.

Wisconsin Bell State-Wide Investigation

Hearings Commenced in Wisconsin Public Service Commission's Investigation of Rates, Practices and Books of the Wisconsin Telephone Co.—A.T. & T. Co. Financing of Associate Company—Valuation of Madison Exchange Property

The initial hearing of a series before the Wisconsin Public Service Commission in the matter of a state-wide investigation of the rates, practices and books of the Wisconsin Telephone Co. opened in Madison on Friday, April 1. The hearings are expected to take about six weeks of time with a decision not probable for many months.

The hearing on April 1 was devoted largely to the testimony of John H. Bickley, who is head of the commission's department of accounts and finance. He testified as to company finances during its existence of 48 years, showing that the company had never operated at a loss.

Mr. Bickley declared that his figures, which among other things showed great expansion and average earnings on stock in the hands of the A. T. & T. Co. of 11.22 per cent a share during the last 17 years, were taken from the company's records and have not as yet been checked.

On April 2, Cyrus G. Hill, of J. G. Wray & Co., consulting engineers, Chicago, testified on the valuation of the Madison exchange property of the Wisconsin Telephone Co. On April 4, Mr. Bickley resumed his testimony telling of the financing of the Wisconsin company through its parent company, the American Telephone & Telegraph Co.

The Wisconsin company has paid a dividend on its common stock every year since its incorporation in 1882, according to the exhibits and testimony of Mr. Bickley on April 1.

"In 44 of these years," he said, "the dividend was 6 per cent or higher, and for 30 of the 44 years the dividend was a flat 8 per cent. It has remained at this level from 1911 to 1930. In only four years did the company fall below 6 per cent and in only two years was the dividend below 5 per cent; namely in 1901 when it was 4¾ per cent and in 1902 when it was 3 7/10 per cent. It has never been below 6 per cent since 1908.

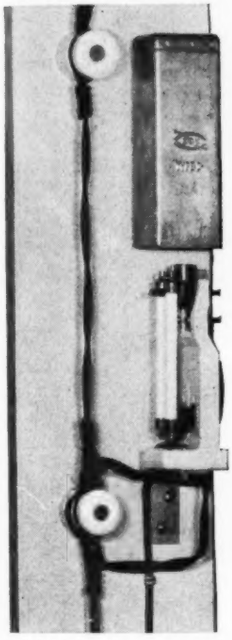
"Out of the $31,000,000 loaned to the Wisconsin company by the A. T. & T. Co. during the past 10 years, $28,000,000 has been paid back in common stock and less than $3,000,000 in cash; but the common stock not only carried a dividend of 8 per cent but was issued to the A. T. & T. Co. at its par value." According to Mr. Bickley, the actual value of this stock was substantially above par value.

"The Wisconsin company paid more than $27,000,000 in dividends to the A. T. & T. Co., but about $10,000,000 of these dividends were in common stock, which in turn has earned 8 per cent dividends during the past 20 years," he said. According to the commission expert this process is accomplished by declaring a dividend on a certain day and on the same day executing a 6 per cent demand note and then liquidating the note by payment in common stock.

Financing of the Wisconsin company has been almost entirely by common stock issues held by the A. T. & T. Co., according to the exhibits. On this stock, Mr. Bickley testified, there has been earned on the average $11.22 a share during the 17 years. The company has been able to add to its surplus from current earnings at the rate of 3.23 per cent a share during the last 17 years so that the surplus has grown from $888,500 in 1915 to $8,728,000 at the end of 1931. This was an increase of 882 per cent.

"In 1930 the company earned $8.39 on each share of stock and in 1931 $6.27," he stated. "When viewed from the standpoint of the net investment in the telephone plant the earnings have averaged from 7.27 per cent for the five years from 1927 to 1931 to an average of 8.43 per cent for

COOK INDOOR OUTDOOR



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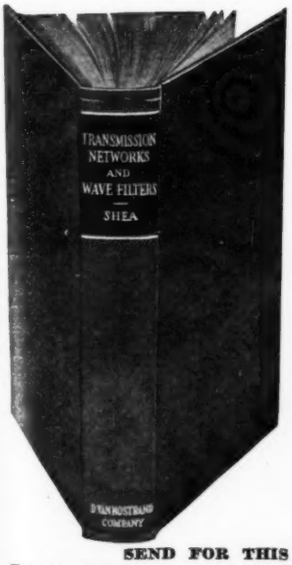
By

T. E. SHEA, B. S., M. S.

Member of the Technical Staff, Bell Telephone Laboratories



The calculation and design of telephone networks and wave filters are fully presented in this book, written by Mr. T. E. Shea of Bell Telephone Laboratories. It embodies the most recent developments in this field as well as the standard practice.

"The Telephone Equipment of 1929," "The New Science Telephony," "Transmission Networks and Wave Filters" and "Radio Broadcasting Engineering" are a few of the subjects capably discussed in this valuable book.

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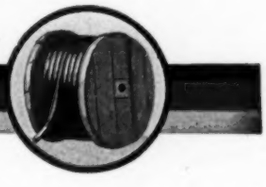

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the 17 years, 1915 to 1931. During the 10-year period, 1922 to 1931, the company rceeived a rate which averaged 8.31 per cent on its net investment.

"These earnings have been derived from exchange and toll services. The rate on the exchange property is slightly less than from the toll system. During 1930 many exchanges in Wisconsin yielded a rate on the total cost of the telephone plant of as high as 10 per cent and in some instances 11, 12 and 13 per cent. Other exchanges realized lower rates."

Wisconsin Company's Rapid Expansion.

The company has expanded rapidly during the last eight years, according to the exhibits. The amount of the telephone plant increased from $36,917,515 at the end of 1924 to $75,138,311 at the end of 1931. Operating revenues grew from $12,018,057 in 1924 to $18,087,521 in 1931. A review of the 17-year period, according to the commission experts, shows that the number of stations increased 152 per cent; the amount of telephone plant, 406 per cent; the gross operating revenues, 301 per cent, and the surplus 882 per cent.

The total volume of revenue amounted to more than $191,000,000 of which $154,667,000 went for operating costs, $23,247,700 to the A. T. & T. Co. as dividends on common stock, and $9,380,000 were carried to surplus for the benefit of the parent corporation, it was testified.

The increase in the cost of property per station was 50 per cent during the last eight years, according to the exhibits.

The major item of operating cost was for the traffic department which cost 25.57 per cent of the revenue. Maintenance and depreciation cost 30.46 per cent. According to Mr. Bickley's records, after the payment of all operating costs, including federal income tax as well as other taxes, depreciation, license fees to the A. T. & T. Co. and appropriations to the pension system, there remained from each dollar of revenue for the entire 17 years about 20 cents for the payment of interest and dividends. Interest consumed a small amount and there remained as earnings on the common stock 17 cents for each dollar of revenue.

License Fee Paid.

During the eight years from 1924 to 1931 there was paid to the A. T. & T. Co. $3,260,760 as license fees. This averaged 2.7 per cent of the gross earnings subject to license contract payments.

In 1930 the Wisconsin company owed the A. T. & T. Co. $12,000,000 upon which it was to pay interest of 5.88 per cent, but this obligation was cancelled by the issuance to the A. T. & T. Co. of $12,000,000 par value common stock paying an 8 per cent dividend. Interest on this $12,000,000 at 5.88 per cent would have been $705,600 for the year, but the 8 per cent dividend on the same amount in stock was $906,000 or $254,200 more than the interest the company was to pay, Mr. Bickley said.

The examination of Mr. Bickley was conducted by Major Alvin C. Reis, special investigator for the commission. Attorney Edwin S. Mack of Milwaukee, member of counsel for the company, interposed questions as he explained how the computations had been made.

Madison Exchange Figures.

The Madison exchange property of the Wisconsin company is carried on the company's books at more than $3,000,000 but only $2,526,000 is properly chargeable against the Madison consumers, Cyrus G. Hill testified on April 2.

Mr. Hill also declared that in 1931 $61,442 were charged against the Madison exchange to property upon which Madison consumers are now asked to pay a return when this property should have been charged against the A. T. & T. Co. for its long distance service. He maintained that $21,000 were expended that same year by the telephone company for unnecessary cable in the Mifflin street conduit.

The Madison exchange should be allowed $66,537 deductions out of the central office exchange account, Mr. Hill said, but the Wisconsin company deducts only $21,000.

He also found fault with the valuation of the Madison exchange's land buildings. He said these are carried on the telephone company's books at $345,000 but he contended that only 44 per cent of this amount should be charged against Madison subscribers. The rates to pay a return on the remaining $200,000 should be borne by long distance consumers, he declared.

So-called station equipment, telephone instruments and other installation in Madison residences and offices, totaling $17,000, should be assigned to the long distance business, Mr. Hill asserted.

Financing by A. T. & T. Co.

In describing the Wisconsin company's financing policy, Mr. Bickley explained the cancellation of a $12,000,000 indebtedness to the A. T. & T. Co. in 1931.

This indebtedness was paid off in the common stock of the state company, issued to the parent company at par value of $100 a share, although carried on the books at a value of $125 a share, he said.

This meant, he testified, that the American company received stock of the book value of $1,250,000 for every $1,000,000 of the $12,000,000 indebtedness, and in addition realized 8 per cent in dividends as compared with a 6 per cent interest rate.

He declared that this was a customary method of financing between the Wisconsin company and the holding company and asserted that out of $35,000,000 in 6 per cent obligations to the A. T. & T. Co., over $29,000,000 were discharged by issuing common stock in this manner.

Mr. Bickley also testified that when the Wisconsin company makes interest payments on its indebtedness to the A. T. & T. Co., it does so monthly instead of quarterly or semi-annually as in other bus-

The Construction of Underground Conduit Plant.

General.

Small and medium size Independent telephone exchanges as a rule employ little if any underground conduit. However, there is an increasing trend toward underground plant, and a discussion of underground construction methods should, therefore, prove interesting to the telephone man who likes to keep posted on all phases of telephone work.

Underground conduit in the small town is utilized chiefly for carrying entrance cables out to points a block or so away from the central office where the distribution cables branch off.

The term "underground conduit" implies a system of one or more ducts into which telephone cables can be pulled or removed. This type of outside plant should not be confused with a buried cable arrangement in which cables are buried either directly in the earth or with a protecting asphalt coating.

Underground conduit work requires careful planning in advance of the actual construction work. The number of ducts, type of duct material and construction, route of conduit run, and an examination of maps showing existing underground structures such as water and gas mains, must all be carefully considered prior to starting any actual construction work. This is much more important in the case of underground work than with other types of outside plant, where oversights or errors in judgment may be corrected without undue expense.

Preliminary Design Work.

The general features involved in the design of underground conduit were discussed in data sheet 1-A, August 15, 1930; so this information will not be gone over at this time.

One of the essential guides in connection with underground conduit construction is the profile map which is a part of the preliminary design work. It should show the profile of the ground over the proposed conduit route and should indicate the correct digging depth for the conduit trench at 50-foot intervals.

As explained in following data sheets, these profile maps are prepared by taking elevations with a surveyor's level and from this field information the trench depths at various points along the route to provide the necessary drainage, can readily be determined. Fig. 1 shows a typical profile map.

It is always advisable before starting construction, that the foreman in charge of the actual operations familiarize himself with city ordinances governing such work.

Trenching.

One of the first steps in underground construction is to lay out the trench. This is accomplished by stretching a chalk line or light rope along the route of the proposed conduit run, and placing a stake every 50 feet on which is indicated the digging depth at that point (digging depth is shown on the profile map).

The chalk line should be placed so that it marks one edge

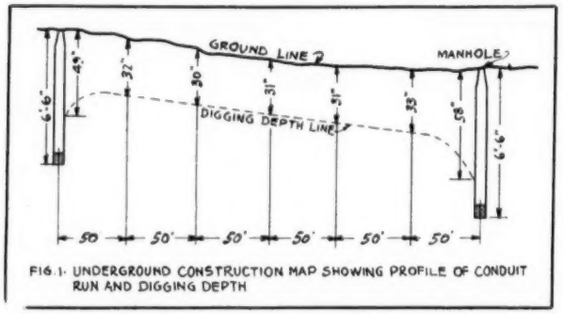

FIG. 1. UNDERGROUND CONSTRUCTION MAP SHOWING PROFILE OF CONDUIT RUN AND DIGGING DEPTH

of the trench. The companies operating in large cities usually dig test holes in each block to determine if foreign underground structures are likely to be encountered along the route selected for the conduit run. This is seldom necessary in the smaller towns, where underground structures are relatively few in number and the locations are usually well known.

The depth to which ducts are placed will depend upon the location. In general, where ducts are located under roadways which carry heavy traffic, they should be placed at a

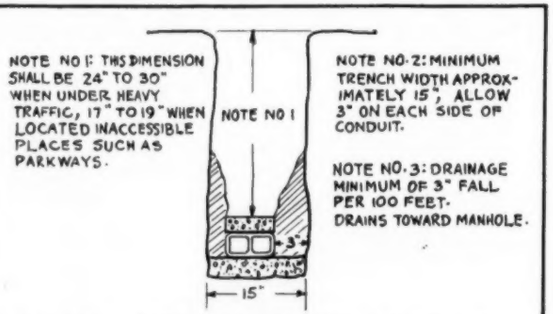
NOTE NO 1: THIS DIMENSION SHALL BE 24" TO 30" WHEN UNDER HEAVY TRAFFIC, 17" TO 19" WHEN LOCATED INACCESSIBLE PLACES SUCH AS PARKWAYS.
NOTE NO 1
NOTE NO 2: MINIMUM TRENCH WIDTH APPROXIMATELY 15", ALLOW 3" ON EACH SIDE OF CONDUIT.
NOTE NO 3: DRAINAGE MINIMUM OF 3" FALL PER 100 FEET. DRAINS TOWARD MANHOLE.
3"
15"

FIG 2 DEPTH, WIDTH AND DRAINAGE REQUIREMENTS FOR UNDERGROUND CONDUIT PLANS.

minimum fill of 24 inches between the top of the conduit and the surface of the street. Conduit located in places readily accessible to workmen but not in danger of heavy traffic may be placed at a depth that will provide 17 to 19 inches between the top of the duct and the street surface.

The trench width will depend upon the number of ducts to be placed. It is considered good practice to make the trench about six inches wider than the ducts so that three inches of space will be provided on each side of the ducts.

Trenches 15 to 18 inches wide are usually adequate for the size of conduit commonly employed in the small telephone exchange.

Trenches should always be dug so that the ducts will tend to drain toward the manholes, either toward a single manhole or from the center of the duct system to the adjacent manholes. The correct drainage should provide a minimum fall of three inches per 100 feet. The profile map should, of course, be worked out so that proper drainage will be provided if the indicated digging depths are followed. Fig. 2 illustrates the depth, width, and drainage requirements for underground conduit.

If foreign pipes are encountered directly in the path of a conduit run, consideration should be given to the possibility of raising or lowering the foreign structure so that it will pass over or under the conduit run. If this is impractical it may be necessary to grade the conduit so as to pass over the foreign structure. In no case should pockets be left in the conduit run. Good drainage must always be provided.

Laying of Ducts—Multiple Tile.

It is customary in laying multiple tile duct to provide a concrete base on which the ducts are laid. The base consists of concrete of 1-4-8 proportions and should be from three to four inches in thickness. The concrete is poured

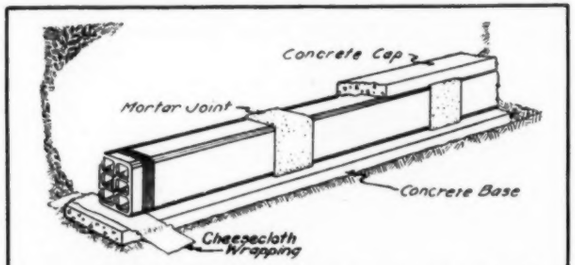

FIG. 3. METHOD OF INSTALLING MULTIPLE TILE DUCT.

into the bottom of the trench and then smoothed off so as to provide the proper duct drainage.

In hard, dense soils the concrete base can often be dispensed with and the ducts laid directly on the bottom of the trench.

After the trench is ready for laying the ducts, the 18 or 24-inch lengths of conduit are placed in it and fastened together by means of steel dowel pins, two to each joint. These dowels insure that the duct holes will be accurately aligned.

A flat strip of cheesecloth or burlap six to nine inches wide is placed around the conduit joint as shown in Fig. 3, and lapped about three inches on top, to prevent the mortar, which is later applied, from entering the ducts.

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MANUFACTURERS' LITERATURE

The following is a brief description of recently published bulletins, catalogs, etc. If you are interested in obtaining copies address your request to the manufacturer.

Notices Previously Published

CLIMBERS
16-page booklet illustrating and describing climbers, straps, pads, tool belts and safety straps for linemen. **W. H. Buckingham, 503 State Street, Binghamton, N. Y.**

CONVERSION KIT
Bulletin No. 203 describes how surplus idle wall telephones accumulating in the stockroom, can be converted to modern, attractive wall Masterphones. Complete simple instructions for this change are included in the bulletin, together with illustrations showing details of construction. **Kellogg Switchboard & Supply Co., 1066 West Adams Street, Chicago, Ill.**

NEW BUSINESS CAMPAIGN
32-page loose-leaf book, outlining a complete advertising campaign to help telephone companies sell new customers and keep old customers sold. For large and small exchanges newspaper advertisements, post cards, folders, and other direct mail pieces are shown. **Kellogg Switchboard & Supply Co., 1066 West Adams Street, Chicago, Ill.**

OUTDOOR TELEPHONES
Bulletin No. 212 contains complete description and specifications of the new Kellogg outdoor telephone. **Kellogg Switchboard & Supply Co., 1066 West Adams Street, Chicago, Ill.**

1-A POWER UNIT
New bulletin No. 176 giving complete description of the No. 1-A Power Unit. This unit with a set of storage batteries, forms a complete power installation, for P.B.X., magneto, or small common battery switchboards. It is an ideal arrangement for an office handling 3,000 calls or less a day. **Kellogg Switchboard & Supply Co., 1066 West Adams Street, Chicago, Ill.**

POWER UNIT
Broadside describing new power units for magneto, P.B.X. and small common battery switchboards handling up to 3,000 calls per day. **Kellogg Switchboard & Supply Co., 1066 W. Adams Street, Chicago, Ill.**

POLES
A 16-page illustrated booklet entitled, "Termites—A Growing Menace to Untreated Timber." **Ayer & Lord Tie Company, Railway Exchange Bldg., Chicago, Ill.**

POLES
"Handbook of Practical Information About Cedar Poles and Butt-treating," is the title of a 40-page, illustrated book now available. **Page & Hill Company, Minneapolis, Minn.**

RECTIFIERS
Catalog TC-37, a sixteen-page illustrated booklet giving complete and up-to-date information regarding Fansteel Rectifiers and other useful data regarding their application. Gives details of the new Lead-Tantalum Rectifiers for Battery Charging and Direct Current power. **Fansteel Products Company, Inc., North Chicago, Ill.**

TRANSMITTER BATTERY POWER UNIT
New bulletin TC-39 describing the new type CAB-4 combination storage battery and trickle charger power unit for magneto operator's transmitter battery, and its use. **Fansteel Products Company, Inc., North Chicago, Illinois.**

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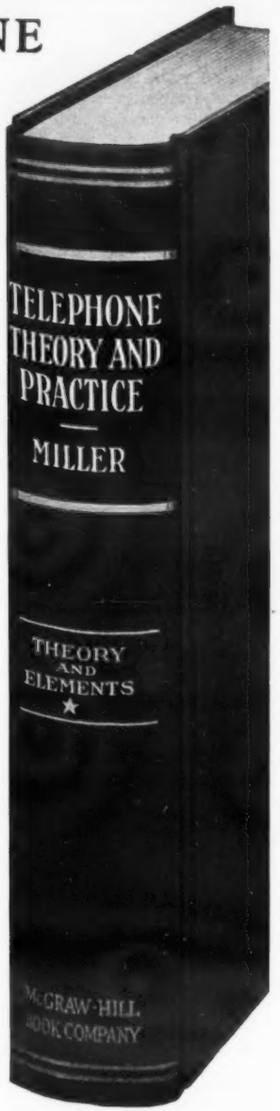
Theory and Elements

by **Kempster B. Miller**

Fellow, American Institute of Electrical Engineers; Member, Western Society of Engineers; Author of American Telephone Practice, 1904, and Joint Author of Telephony, 1912.



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1. **The rank-and-file telephone worker as a preparation for an understanding of the practical phases of his job.**
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inesses, and therefore gives the American company the use of the interest funds instead of retaining them for itself for a longer period.

Some $4,000,000 of the $12,000,000 indebtedness of which Mr. Bickley spoke, represented purchases of telephone equipment from the Western Electric Co., it was testified. The parent company assumed this liability and cancelled it by accepting the Wisconsin company's stock, Mr. Bickley said.

Aside from this method of financing, the Wisconsin company frequently paid dividends to the A. T. & T. Co., which owns practically all of the common stock, but further issuance of its stock brought an added return to the American company of 8 per cent, the witness asserted. He described some $10,000,000 of stock dividends, having previously related that all dividends paid to the holding company in the last 17 years amounted to more than $23,000,000.

During that 17-year period, Mr. Bickley said the Wisconsin company earned $9,500,000 more which was transferred to surplus, and in 1931 it dipped into the surplus for $750,000 to meet its dividend payment to the holding company.

The dividends paid to the A. T. & T. Co. last year were higher than the year before, and in the last nine years total dividends were greater than those paid in all stock in the 40 years from 1882 to 1922.

Edwin S. Mack of Milwaukee, member of counsel for the Wisconsin company, stipulated during the questioning of Mr. Bickley that he would wait until all commission exhibits were presented so that he might study them before determining whether any objections would be raised to the accounting data.

All of it has been obtained from the company's books and reports made to the commission.

New York Convention Changed to Two Days Instead of Three.

Instead of a three-day convention, the Up-State Telephone Association of New York has announced it is rearranging its program to confine all activities to two days. The convention will be held at the Jamestown Hotel, Jamestown, May 26-27.

National Telephone & Telegraph Corporation
(Subsidiary of Associated Telephone and Telegraph Company)
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CHICAGO, ILLINOIS

DIVIDEND NOTICE

The Board of Directors of National Telephone & Telegraph Corporation has declared the regular dividend of $1.75 per share on the First Preferred stock and 88c per share on the Class A stock for the quarter ending April 30th, 1932, payable May 1st, 1932, to stockholders of record at the close of business April 16th, 1932.

R. J. MUNRO,
Secretary

Condensed Telephone News

Companies Are Urgently Requested to Forward to Us Promptly News Concerning Construction, Rebuilding, Financing, Election of Officers, Sales and Purchases of Exchanges or Other Activities

New Telephone Companies and New Incorporations.

NEW ATHENS, ILL.—The New Dutch Hill Telephone Co. has been incorporated with a capital stock of $1,200 by Louis Kraft, Peter Junk, Wm. Kaesberg and Edmund P. Baer.

HICKORY, KY.—The Clark's River Telephone Co. has been incorporated by J. O. Gough, Joe Winn and Rudy Watkins with a capital stock of $2,000.

Finanical.

SAN FRANCISCO, CALIF.—In mailing dividend checks to stockholders, H. D. Pillsbury, president of the Pacific Telephone & Telegraph Co., said the company's gross revenues in the first two months of 1932 were about 4 per cent less than the average of the preceding three months. A net loss of 17,851 telephones was recorded in January and February.

KNOXVILLE, ILL.—At the annual meeting of the Farmers Telephone Co., Chas Wylan, manager, reported the finances of the company in good shape with $660 on hand and $90 due from customers.

The present operators were continued for another year with a slight increase in salary.

Franchises.

ROCKWELL CITY, IOWA.—By a vote of 256 to 253, residents of Rockwell City on March 18 voted a 25-year franchise to the Iowa Continental Telephone Co.

Under previous agreement, all expense of the special election was paid by the telephone company. Also, with the granting of the proposed franchise, the telephone company has agreed to relinquish any rights that it might have claimed to a previously existing franchise of a perpetual nature.

The franchise granted to the Iowa Continental Telephone Co. is not exclusive, and does not prevent the organization and establishment of another telephone plant in the city.

Construction.

DENVER, COLO.—Seven million dollars will be spent by the Mountain States Telephone & Telegraph Co. in 1932 for improvement and extension of service, it was announced at the office of President Frederick H. Reid on April 2. This will be in addition to $14,000,000 the company expends annually in wages, rent, taxes and related matters.

TAMPA, FLA.—At the annual meeting of the Peninsular Telephone Co., a normal construction budget of approximately $500,000 for improvements and extensions was approved.

The telephone company operates in Hillsborough, Pinellas, Manatee, Sarasota and Polk counties with toll lines extending into Pasco, Hernando, Highlands, Seminole and DeSoto counties. W. G. Brorein, president, explained that the budget, although a big figure, is no more than is necessary

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to take care of normal extensions and improvements of service.

The board of directors expressed satisfaction with results of the year's operations and passed a resolution commending "the effective cooperation of officers and employes of the company."

BRIGHTON, ILL.—The Brighton Telephone Co. has purchased a lot and will erect a fireproof exchange building as soon as possible.

CHICAGO, ILL.—At its meeting on March 23 the board of directors of the Illinois Bell Telephone Co. approved expenditures of $3,324,073 for additions and betterments to the telephone plant in the city and $1,866,141 for the territory outside of Chicago, making a total of $5,190,214. This brings the total amount approved for such additions and betterments so far this year to $6,691,366.

IDA GROVE, IOWA.—The Western Telephone Co. successfully made its cut-over from its old exchange to its new $68,000 property in this city. The new system includes not only a new exchange building but also rebuilt pole lines, and new and heavier cables.

BOSTON, MASS.—At the regular March appropriation meeting the executive committee of the New England Telephone & Telegraph Co. authorized the expenditure of $1,419,141 for new construction and improvements in plant necessary to meet the demand for service.

For Massachusetts the appropriations aggregate $1,058,078; for Rhode Island, $84,502; for Maine, $183,535; for New Hampshire, $61,045 and for Vermont, $32,431.

Of the amount authorized $92,714 are appropriated for central office equipment, $14,550 for station equipment, $391,616 for exchange lines, $39,353 for toll lines and $876,158 to cover the cost of hundreds of routine additions to plant in all parts of the company's territory.

NEW YORK, N. Y.—The expenditure of $11,613,125 for new construction throughout the state was authorized by the board of directors of the New York Telephone Co. at the regular monthly meeting held March 23, according to an announcement by J. S. McCulloh, president. This brings the total appropriations for the first three months of the year to $16,751,900, of which $14,122,335 have been provided for the extension of facilities in the metropolitan area.

BLUFFTON, OHIO.—Extension of the local telephone service to include 40 subscribers in the Rockport exchange was to be completed early this month, according to an announcement by Eli Deppler, manager of the Bluffton Telephone Co. Erection of the lines has been completed and the work is expected to cost approximately $5,000.

MILWAUKEE, WIS.—Construction of an additional 52 miles of overhead cable on the proposed Chicago - Milwaukee - Twin Cities improved long distance line is planned this year by the Wisconsin Telephone Co., it was announced recently by W. C. Lallier, transmission engineer.

New cable is to be installed between Stevens Point and Marshfield, and between Baldwin and Hudson.

The Twin Cities line is expected to be completed during 1933. The program for next year calls for 105 miles of cable between Marshfield and Baldwin.

The company is gradually crossing the state with a coordinated long distance system which when completed will have its primary switching centers in Milwaukee, Appleton, Eau Claire, Madison and Stevens Point. Secondary switching points will be at Ashland, Green Bay, La Crosse, Marinette, Rhinelander and Rice Lake, with additional secondary centers to be built at Janesville, Fond du Lac, Lake Geneva and Prentice.

Miscellaneous.

LANCASTER, CALIF.—The Antelope Valley Telephone Co. here was recently sold by O. F. Goodrich, who has been owner and manager for the last 26 years.

PINCKNEYVILLE, ILL.—The Pinckneyville telephone system, formerly under the Du Quoin district of the Illinois Commercial Telephone Co., is now in a district of its own, with headquarters in this city. The new manager is Fred Fike, formerly of Coulterville. The change became effective March 1.

Mr. Fike's territory includes Pinckneyville, Coulterville and Cutler. His office is in the new telephone exchange of the Illinois Commercial Telephone Co.

The change is made because of the growing importance of the company's business here, it is reported. The company spent about $40,000 on improvements in Pinckneyville in 1931, putting in an entirely new system and erecting a brick telephone exchange building.

SALEM, IND.—The local exchange of the Southern Indiana Telephone & Telegraph Co. was totally destroyed by fire recently, causing estimated damages of $20,000.

A toll line to New Albany was established quickly by the local telephone crew, and an attempt to do likewise to Seymour was blocked by a reported "break" between Brownstown and Seymour. Crews were sent out to repair this break.

E. S. Welch, general manager of the southern Indiana division, of Seymour, made a thorough inspection of the ruined building and took complete charge of the reconstruction work.

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